

CRPL-F58

National Bureau of Standards  
Library, N. W. Bldg.

Reference book not to be  
taken from the Library.

JUN 27 1949

## IONOSPHERIC DATA

ISSUED

JUNE 1949

PREPARED BY CENTRAL RADIO PROPAGATION LABORATORY  
National Bureau of Standards  
Washington, D.C.



## IONOSPHERIC DATA

## CONTENTS

	Page
Symbols and Terminology; Conventions for Determining Median Values . . . . .	2
Monthly Average and Median Values of World-Wide Ionospheric Data . . . . .	4
Ionospheric Data for Every Day and Hour at Washington, D. C. . . . .	6
Ionosphere Disturbances . . . . .	6
American and Zürich Provisional Relative Sunspot Numbers . . . . .	8
Solar Coronal Intensities Observed at Climax, Colorado. .	8
Errata . . . . .	9
Tables of Ionospheric Data . . . . .	10
Graphs of Ionospheric Data . . . . .	38
Index of Tables and Graphs of Ionospheric Data in CRPL-F5E . . . . .	53

## SYMBOLS AND TERMINOLOGY; CONVENTIONS FOR DETERMINING MEDIAN VALUES

Beginning with data reported for January 1949, the symbols, terminology, and conventions for the determination of median values used in this report (CRPL-F series) conform as far as practicable to those adopted at the Fifth Meeting of the International Radio Consultative Committee (C.C.I.R.) in Stockholm, 1948, and given in detail on pages 2 to 10 of the report CRPL-F53, "Ionospheric Data," issued January 1949.

For symbols and terminology used with data prior to January 1949, see report IRPL-C61, "Report of International Radio Propagation Conference, Washington, 17 April to 5 May, 1944," previous issues of the F series, in particular, IRPL-F5, CRPL-F24, F33, F50, and report CRPL-7-1, "Preliminary Instructions for Obtaining and Reducing Manual Ionospheric Records."

Following the recommendations of the Washington (1944) and Stockholm (1948) conferences, beginning with data for January 1945, median values are published wherever possible. Where averages are reported, they are, at any hour, the average for all the days during the month for which numerical data exist.

In addition to the conventions for the determination of medians given in Appendix 5 of Document No. 293 E of the Stockholm conference, which are listed on pages 9 and 10 of CRPL-F53, the following conventions are used in determining the medians for hours when no measured values are given because of equipment limitations and ionospheric irregularities. Symbols used are those given on pages 2-9 of CRPL-F53 (Appendixes 1-4 of Document No. 293 E referred to above).

a. For all ionospheric characteristics:

Values missing because of A, B, C, F, L, M, N, Q, R, S, or T (see terminology referred to above) are omitted from the median count.

b. For critical frequencies and virtual heights:

Values of foF2 (and foE near sunrise and sunset) missing because of E are counted as equal to or less than the lower limit of the recorder. Values of h'F2 (and h'E near sunrise and sunset) missing for this reason are counted as equal to or greater than the median. Other characteristics missing because of E are omitted from the median count. See CRPL-F38, page 9.

Values missing because of D are counted as equal to or greater than the upper limit of the recorder.

Values missing because of G are counted:

1. For  $f_oF_2$ , as equal to or less than  $f_oF_1$ .
2. For  $h'F_2$ , as equal to or greater than the median.

Values missing because of W are counted:

1. For  $f_oF_2$ , as equal to or less than the median.
2. For  $h'F_2$ , as equal to or greater than the median.

Values missing for any other reason are omitted from the median count.

c. For MUF factors (M-factors):

Values missing because of G or W are counted as equal to or less than the median.

Values missing for any other reason are omitted from the median count.

d. For sporadic E (Es):

Values of  $fEs$  missing because of G (no Es reflections observed, the equipment functioning normally otherwise) are counted as equal to or less than the median  $f_oE$ , or equal to or less than the lower frequency count of the recorder.

Values of  $fEs$  missing for any other reason, and values of  $h'Es$  missing for any reason at all are omitted from the median count.

Beginning with data for November 1945, doubtful monthly median values for ionospheric observations at Washington, D. C., are indicated by parentheses, in accordance with the practice already in use for doubtful hourly values. The following are the conventions used to determine whether or not a median value is doubtful:

1. If only four values or less are available, the data are considered insufficient and no median value is computed.

2. For the  $F_2$  layer, if only five to nine values are available, the median is considered doubtful. The E and  $F_1$  layers are so regular in their characteristics that, as long as there are at least five values, the median is not considered doubtful.

3. For all layers, if more than half of the values used to compute the median are doubtful (either doubtful or interpolated), the median is considered doubtful.

The same conventions are used by the CRPL in computing the medians from tabulations of daily and hourly data for stations other than Washington, beginning with the tables in IRPL-F1F.

## MONTHLY AVERAGE AND MEDIAN VALUES OF WORLD-WIDE IONOSPHERIC DATA

The ionospheric data given here in tables 1 to 29 and figures 1 to 58 were assembled by the Central Radio Propagation Laboratory for analysis and correlation, incidental to CRPL prediction of radio propagation conditions. The data are median values unless otherwise indicated. The following are the sources of the data in this issue:

Australian Council for Scientific and Industrial Research,  
Radio Research Board:  
Brisbane, Australia  
Canberra, Australia

Australian Department of Supply and Shipping, Bureau of  
Mineral Resources, Geophysical Section:  
Watheroo, W. Australia

British Department of Scientific and Industrial Research,  
Radio Research Board:  
Lindau/Harz, Germany

Radio Wave Research Laboratory, Central Broadcasting Administration:  
Chungking, China  
Lanchow, China

French Ministry of Naval Armaments (Section for Scientific Research):  
Fribourg, Germany

All India Radio (Government of India), New Delhi, India:  
Bombay, India  
Delhi, India  
Madras, India  
Tiruchirapalli, India

New Zealand Radio Research Committee:  
Christchurch, New Zealand  
Rarotonga I.

South African Council for Scientific and Industrial Research:  
Capetown, Union of S. Africa  
Johannesburg, Union of S. Africa

National Bureau of Standards (Central Radio Propagation Laboratory):  
Baton Rouge, Louisiana (Louisiana State University)  
Boston, Massachusetts (Harvard University)  
Huancayo, Peru (Instituto Geofisico de Huancayo)  
Maui, Hawaii  
Palmyra I.



National Bureau of Standards (continued):

San Francisco, California (Stanford University)  
San Juan, Puerto Rico (University of Puerto Rico)  
Trinidad, British West Indies  
Washington, D. C.  
White Sands, New Mexico

The tables and graphs of ionospheric data are correct for the values reported to the CRPL, but, because of variations in practice in the interpretation of records and scaling and manner of reporting of values, may at times give an erroneous conception of typical ionospheric characteristics at the station. Some of the errors are due to:

- a. Differences in scaling records when spread echoes are present.
- b. Omission of values when  $f_oF_2$  is less than or equal to  $f_oF_1$ , leading to erroneously high values of monthly averages or median values.
- c. Omission of values when critical frequencies are less than the lower frequency limit of the recorder, also leading to erroneously high values of monthly average or median values.

These effects were discussed on pages 6 and 7 of the previous F-series report IRPL-F5.

Ordinarily a blank space in the fEs column of a table is the result of the fact that a majority of the readings for the month are below the lower limit of the recorder. Blank spaces at the beginning and end of columns of h'F<sub>1</sub>, f<sub>o</sub>F<sub>1</sub>, h'E, and f<sub>o</sub>E are usually the result of diurnal variation in these characteristics. Complete absence of medians of h'F<sub>1</sub> and f<sub>o</sub>F<sub>1</sub> is usually the result of seasonal effects.

The dashed-line prediction curves of the graphs of ionospheric data are obtained from the predicted zero-muf contour charts of the CRPL-D series publications. The following points are worthy of note:

- a. Predictions for individual stations used to construct the charts may be more accurate than the values read from the charts since some smoothing of the contours is necessary to allow for the longitude effect within a zone. Thus, inasmuch as the predicted contours are for the center of each zone, part of the discrepancy between the predicted and observed values as given in the F series may be caused by the fact that the station is not centrally located within the zone.
- b. The final presentation of the predictions is dependent upon the latest available ionospheric and radio propagation data, as well as upon predicted sunspot number.

- c. There is no indication on the graphs of the relative reliability of the data; it is necessary to consult the tables for such information.

The following predicted smoothed 12-month running-average Zürich sunspot numbers were used in constructing the contour charts:

<u>Month</u>	<u>Predicted Sunspot No.</u>				
	1949	1948	1947	1946	1945
December		114	126	85	38
November		115	124	83	36
October		116	119	81	23
September		117	121	79	22
August		123	122	77	20
July		125	116	73	
June		129	112	67	
May	108	130	109	67	
April	109	133	107	62	
March	111	133	105	51	
February	113	133	90	46	
January	112	130	88	42	

## IONOSPHERIC DATA FOR EVERY DAY AND HOUR AT WASHINGTON, D. C.

The data given in tables 30 to 41 follow the scaling practices given in the report IRPL-C61, "Report of International Radio Propagation Conference," pages 36 to 39, and the median values are determined by the conventions given above under "Symbols and Terminology; Conventions for Determining Median Values."

## IONOSPHERE DISTURBANCES

Table 42 presents ionosphere character figures for Washington, D. C., during May 1949, as determined by the criteria presented in the report IRPL-R5, "Criteria for Ionospheric Storminess," together with Cheltenham, Maryland, geomagnetic X-figures, which are usually covariant with them.

Table 43 lists for the stations whose locations are given the sudden ionosphere disturbances observed on the continuous field intensity recordings made at the Sterling Radio Propagation Laboratory during May 1949.



Table 44 lists for the stations whose locations are given the sudden ionosphere disturbances observed at the Brentwood and Somerton, England, receiving stations of Cable and Wireless, Ltd., for various days in April and May 1949.

Table 45 lists for the stations whose locations are given the sudden ionosphere disturbances observed at the Riverhead, New York, receiving station of RCA Communications, Inc., from May 5 through May 30, 1949.

Table 46 lists for the stations whose locations are given the sudden ionosphere disturbances observed at the Platanos, Argentina, receiving station of the International Telephone and Telegraph Corporation for various days in February, March, and April 1949.

Table 47 lists for the stations whose locations are given the sudden ionosphere disturbances observed at the Point Reyes, California, receiving station of RCA Communications, Inc., for May 7 and 10, 1949.

Table 48 gives provisional radio propagation quality figures for the North Atlantic and North Pacific areas, for 01 to 12 and 13 to 24 GCT, April 1949, compared with the CRPL daily radio disturbance warnings, which are primarily for the North Atlantic paths, the CRPL weekly radio propagation forecasts of probable disturbed periods, and the half-day Cheltenham, Maryland, geomagnetic K-figures.

The radio propagation quality figures are prepared from radio traffic and ionospheric data reported to the CRPL, in a manner basically the same as that described in IRPL-R31, "North Atlantic Radio Propagation Disturbances, October 1943 through October 1945," issued February 1, 1946. The scale conversions for each report are revised for use with the data beginning January 1948, and statistical weighting replaces what was, in effect, subjective weighting. Separate master distribution curves of the type described in IRPL-R31 were derived for the part of 1946 covered by each report; data received only since 1946 are compared with the master curve for the period of the available data. A report whose distribution is the same as the master is thereby converted linearly to the Q-figure scale. Each report is given a statistical weight which is the reciprocal of the departure from linearity. The half-daily radio propagation quality figure, beginning January 1948, is the weighted mean of the reports received for that period.

These radio propagation quality figures give a consensus of opinion of actual radio propagation conditions as reported by the half day over the two general areas. It should be borne in mind, however, that though the quality may be disturbed according to the CRPL scale, the cause of the disturbance is not necessarily known. There are many variables that must be considered. In addition to ionospheric storminess itself as the cause, conditions may be reported as disturbed because of seasonal characteristics such as are particularly evident in the pronounced day and night contrast

over North Pacific paths during the winter months, or because of improper frequency usage for the path and time of day in question. Insofar as possible, frequency usage is included in rating the reports. Where the actual frequency is not shown in the report to the CRPL, it has been assumed that the report is made on the use of optimum working frequencies for the path and time of day in question. Since there is a possibility that all the disturbance shown by the quality figures is not due to ionospheric storminess alone, care should be taken in using the quality figures in research correlations with solar, auroral, geomagnetic, or other data. Nevertheless, these quality figures do reflect a consensus of opinion of actual radio propagation conditions as found on any one half day in either of the two general areas.

## AMERICAN AND ZÜRICH PROVISIONAL RELATIVE SUNSPOT NUMBERS

Table 49 presents the daily American relative sunspot number,  $R_A$ , computed from observations communicated to CRPL by observers in America and abroad. Beginning with the observations for January 1948, a new method of reduction of observations is employed such that each observer is assigned a scale-determining "observatory coefficient," ultimately referred to Zürich observations in a standard period, December 1944 to September 1945, and a statistical weight, the reciprocal of the variance of the observatory coefficient. The daily numbers listed in the table are the weighted means of all observations received for each day. Details of the procedure are given in the Publication of the Astronomical Society of the Pacific, issued February 1949, in an article entitled "Reduction of Sunspot-Number Observations." The American relative sunspot number computed in this way is designated  $R_A$ . It is noted that a number of observatories abroad, including the Zürich observatory, are included in  $R_A$ . The scale of  $R_A$  was referred specifically to that of the Zürich relative sunspot numbers in the standard comparison period; since that time,  $R_A$  is influenced by the Zürich observations only in that Zürich proves to be a consistent observer and receives a high statistical weight. In addition, this table lists the daily provisional Zürich sunspot numbers,  $R_Z$ .

## SOLAR CORONAL INTENSITIES OBSERVED AT CLIMAX, COLORADO

In tables 50a and 50b are listed the intensities of the green (5303Å) line of the emission spectrum of the solar corona as observed during May 1949 by the High Altitude Observatory of Harvard University and the University of Colorado at Climax, Colorado, for east and west limbs,

respectively, at 5-degree intervals of position angle north and south of the solar equator at the limb. Beginning January 11, 1949, the actual measurements are on solar rotation coordinates rather than astronomical coordinates; thus values of the correction P given in previous coronal tables are omitted. The time of observation is given to the nearest tenth of a day, GCT. The tables of coronal observations in CRPL-F29 to F41 listed the data on astronomical coordinates; the present format on solar rotation coordinates is in conformity with the tables of CRPL-1-4, "Observations of the Solar Corona at Climax, 1944-46."

Tables 51a and 51b give similarly the intensities of the first red (6374Å) coronal line; tables 52a and 52b list the intensities of the second red (6704Å) coronal line. The following symbols are used in tables 50, 51, and 52: a, observation of low weight; -, corona not visible; and x, position angle not included in plate estimates.

### ERRATA

1. CRPL-F57, p. 13, table 19: First column at 01 should read "460."
2. Graphs of percentage of time occurrence of fEs: In the case of stations for which the lower limit of the recorder is greater than 3.1 Mc, the lowest limiting frequency given below each graph presenting percentage of time occurrence of fEs should be adjusted in accordance with the lower limit of the sweep. These stations are Bagneux, France, beginning with March 1947 (F36), Okinawa I. from October 1948 (F52), and Singapore, British Malaya, for November 1948 (F56).

## TABLES OF IONOSPHERIC DATA

Table 1

Washington, D. C. (39.0°N, 77.5°W)

May 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	290	6.8						2.7
01	280	6.5						2.6
02	280	6.3						2.7
03	280	5.8					1.5	2.7
04	275	5.4						2.7
05	280	5.4						2.9
06	250	6.3	---	---	120	2.4	3.4	3.0
07	240	6.6	230	4.3	110	2.9	3.6	2.9
08	315	7.0	220	4.8	100	3.2	3.6	2.8
09	360	7.1	210	5.0	100	3.5	4.0	2.8
10	370	7.6	200	5.3	100	3.6	4.0	2.8
11	380	7.8	200	5.6	100	3.8		2.7
12	380	8.2	210	5.6	100	3.9		2.7
13	380	8.4	215	5.5	100	3.8	3.7	2.7
14	380	8.3	220	5.4	100	3.8		2.7
15	370	8.5	220	5.3	100	3.7		2.7
16	350	8.7	230	5.0	100	3.4	3.5	2.7
17	320	8.7	240	4.6	100	3.1	3.6	2.8
18	270	8.8	240	---	110	2.5	4.0	2.8
19	260	8.8			130	2.0	3.4	2.9
20	250	8.4					1.9	2.8
21	250	7.8					1.9	2.7
22	270	7.2						2.7
23	280	7.0						2.6

Time: 75.0°W.

Sweep: 1.0 Mc to 25.0 Mc in 15 seconds.

Table 2

Lindau/Harz, Germany (51.6°N, 10.1°E)

April 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	300	7.4						
01	300	6.8						
02	300	6.6						
03	300	6.2						1.8
04	300	6.2						
05	300	6.0						2.0
06	280	6.8			110	2.0	2.6	
07	240	7.6			100	2.6	3.2	
08	240	8.8			100	3.0	3.5	
09	240	9.2			100	3.4	4.0	
10	210	10.2			100	3.6	3.9	
11	230	10.4			100	3.6	4.4	
12	210	10.8			100	3.6	4.0	
13	215	10.7			100	3.6	4.2	
14	230	10.8			100	3.6	4.0	
15	240	10.7			100	3.4	3.6	
16	240	10.7			100	3.2	3.9	
17	250	10.6			100	2.8	3.5	
18	260	10.2			100	2.4	2.9	
19	270	10.1			100	1.8	2.5	
20	250	9.5						
21	240	8.4						
22	240	7.8						
23	280	7.5						

Time: 15.0°E.

Sweep: 1.4 Mc to 16.0 Mc in 7 minutes.

Table 3

Boston, Massachusetts (42.4°N, 71.2°W)

April 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	278	7.3						2.6
01	278	7.0						2.6
02	272	6.3						2.5
03	275	5.8						2.5
04	270	5.6					1.2	2.6
05	265	5.8			135	1.6	1.0	2.7
06	262	7.2	---	---	135	2.1		2.9
07	262	8.4	---	---	---	---		2.9
08	268	9.4	---	---	---	---		2.9
09	305	9.3	---	---	---	---		2.8
10	(322)	(9.4)	---	---	---	---		(2.8)
11	(338)	(7.5)	---	---	---	---		(2.8)
12	(300)	(10.1)	---	---	---	---		(2.7)
13	(308)	(9.7)	---	---	---	---		(2.7)
14	288	(9.4)	---	---	---	---		(2.8)
15	285	(10.4)	---	---	---	---		(2.9)
16	270	10.3	---	---	---	---		2.9
17	268	9.7			130	2.2		2.8
18	262	9.4			---	---		2.8
19	250	9.0			---	---		2.8
20	250	8.2						2.7
21	265	7.5						2.7
22	275	7.6						2.6
23	280	7.4						2.6

Time: 75.0°W.

Sweep: 0.8 Mc to 14.0 Mc in 1 minute.

Table 4

San Francisco, California (37.4°N, 122.2°W)

April 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	300	6.4						2.4
01	300	6.6						2.4
02	290	6.6						2.4
03	285	6.2						2.4
04	280	6.0						2.4
05	300	5.8						2.4
06	260	6.8	---	---	---	2.2		2.6
07	240	8.6	---	---	120	2.7		2.8
08	240	9.7	---	---	110	(3.4)		2.7
09	240	11.0	215	---	110	(3.6)	3.9	2.6
10	250	11.4	220	---	110	3.8		2.6
11	275	11.7	220	6.4	110	3.9		2.6
12	320	12.2	220	6.2	110	4.0		2.6
13	300	12.6	220	6.6	110	3.9		2.6
14	320	12.2	220	---	120	3.3		2.8
15	240	12.0	225	---	110	3.7		2.6
16	240	11.5	---	---	110	(3.5)		2.6
17	240	11.4			120	3.0		2.6
18	240	11.2			120	2.4	1.6	2.7
19	235	10.2					0.7	2.8
20	230	8.7						2.7
21	240	7.6					2.6	2.6
22	260	7.0						2.6
23	280	6.8						2.5

Time: 120.0°W.

Sweep: 1.3 Mc to 14.0 Mc in 4 minutes.



Table 5

White Sands, New Mexico (32.3°N, 106.5°W)

April 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	300	7.2						2.5
01	300	7.1						2.6
02	280	7.0						2.6
03	285	6.9						2.6
04	280	6.6						2.6
05	300	6.4						2.5
06	260	7.4			120	2.0	2.5	2.8
07	240	9.6			120	2.7	3.6	2.8
08	240	10.6			120	3.2	4.3	2.8
09	240	11.3			110	3.5	4.9	2.7
10	225	11.8	220	6.5	120	3.7	4.9	2.6
11	230	12.4	230	6.6	120	4.0		2.6
12	250	12.8	235	6.6	120	4.0		2.6
13	240	13.0	235	6.3	110	4.0	4.8	2.6
14	250	13.0	235	6.6	110	3.9		2.6
15	240	12.6			110	3.6		2.6
16	240	12.4			110	3.3	4.2	2.6
17	260	11.9			120	2.8	3.8	2.6
18	250	11.6			110	2.1	3.3	2.7
19	240	10.5					2.6	2.8
20	240	9.0					2.6	2.7
21	260	8.0					2.2	2.6
22	280	7.5					2.5	2.6
23	310	7.4						2.5

Time: 105.0°W.

Sweep: 0.8 Mc to 14.0 Mc in 2 minutes.

Table 6

Baton Rouge, Louisiana (30.5°N, 91.2°W)

April 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	300	7.6						2.8
01	290	7.4						2.8
02	290	7.1						2.8
03	290	7.0						2.8
04	290	6.7						2.8
05	290	6.6						2.8
06	270	7.6						3.0
07	280	9.6	240		125	2.8		3.0
08	290	10.6	230		130	(3.4)		2.9
09	300	11.4	230		(120)	(3.6)		2.8
10	320	12.2	220			(3.7)		2.8
11	326	12.3	(265)			(3.7)		2.7
12	325	12.8	(265)	6.4		(3.7)		2.7
13	330	13.0	230					2.7
14	330	12.6	230					2.7
15	330	12.4	230		(120)	(3.6)		2.7
16	320	12.2	240		120	(3.3)		2.8
17	300	12.1	260		120	2.9		2.7
18	270	11.1			130	2.3		2.9
19	250	10.0						2.8
20	250	8.6						2.8
21	280	8.1						2.8
22	290	7.7						2.8
23	290	7.6						2.8

Time: 90.0°W.

Sweep: 2.12 Mc to 15.3 Mc in 8 minutes 30 seconds, automatic operation.

Table 7

Maui, Hawaii (20.8°N, 156.5°W)

April 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	280	12.1						(2.9)
01	260	11.8						(2.9)
02	260	9.6						2.8
03	280	8.4						2.7
04	295	7.6						2.7
05	300	7.4						2.7
06	280	7.4						2.8
07	250	9.4				2.6		2.9
08	250	10.9			120	3.2		2.8
09	250	12.0	245		110	3.5		2.6
10	305	13.0	240		115			2.5
11	330	14.2	260		110			2.5
12	340	15.2	250	(6.6)				2.6
13	340	15.7	260					2.6
14	350	15.8	260					2.6
15	340	15.6	250	6.6	110	3.6		2.6
16	340	15.4	250		110	3.4	3.6	2.6
17	315	14.8	250		110	3.0	4.3	2.7
18	280	14.5				2.4	4.3	(2.7)
19	270	14.6					3.3	(2.7)
20	280	14.2					3.1	(2.7)
21	280	13.8						(2.8)
22	280	12.9						(2.7)
23	290	12.5						(2.7)

Time: 160.0°W.

Sweep: 2.2 Mc to 16.0 Mc in 1 minute, above 16.0 Mc, manual operation.

Table 8

San Juan, Puerto Rico (18.4°N, 66.1°W)

April 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00		10.6						2.8
01		10.1						2.8
02		9.0						2.9
03		8.1						2.9
04		7.8						2.8
05		7.5						2.8
06		7.2						2.8
07	240	9.3				3.6		3.0
08	250	11.0				4.0	3.1	2.9
09	270	12.2					3.6	2.8
10	300	13.0					3.8	2.8
11	310	13.5					4.1	2.7
12	320	14.0					4.1	2.7
13	(325)	(13.4)					4.1	2.7
14	340	13.5				(6.6)	4.0	2.6
15	330	13.0				6.2	3.8	2.7
16	315	13.0				6.0	3.5	2.6
17	280	12.5					3.0	2.6
18	270	11.9						2.7
19	270	11.1						2.7
20		10.9						2.6
21		10.8						2.7
22		10.9						2.7
23		11.0						2.8

Time: 60.0°W.

Sweep: 2.8 Mc to 13.0 Mc in 9 minutes, supplemented by manual operation.



Table 9

Trinidad, Brit. West Indies (10.6°N, 61.2°W)

April 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	260	11.9						3.0
01	250	10.8						3.0
02	240	9.6						2.9
03	240	8.6						2.9
04	250	7.6						2.8
05	260	6.8						2.8
06	280	7.2					2.2	2.8
07	240	9.8			120	2.7	3.1	3.1
08	240	11.4	230	4.5	120	3.3	3.8	3.0
09	250	12.5	230	4.9	120	3.6	4.0	2.9
10	260	13.4	220	5.2	120	3.9	4.4	2.8
11	270	13.9	220	5.4	120	4.0	4.6	2.8
12	280	14.2	220	5.4	120	4.1	4.8	2.8
13	280	14.2	230	5.4	120	4.1	4.9	2.7
14	280	13.9	220	5.4	120	4.0	5.1	2.7
15	280	13.4	230	5.2	120	3.8	5.0	2.7
16	270	13.0	240	5.0	120	3.4	4.8	2.7
17	270	12.5	250	5.0	120	2.9	4.4	2.6
18	270	12.0			120	2.2	3.4	2.6
19	300	11.8					3.6	2.6
20	300	12.4					2.8	2.8
21	290	12.4					2.2	2.7
22	280	12.8						2.8
23	260	12.5						2.9

Time: 60.0°W.

Sweep: 1.5 Mc to 18.0 Mc, manual operation.

Table 10

Palmyra I. (5.9°N, 162.1°W)

April 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	240	13.8						2.9
01	240	(12.4)						2.4
02	250	(11.8)						(2.7)
03	250	(11.1)						(2.8)
04	240	(9.7)						1.8
05	245	8.8						2.1
06	250	7.9						2.2
07	270	10.0						(3.0)
08	250	11.1			130	2.6		2.0
09	250	11.8	240	---	120	3.3		3.6
10	270	12.4	(240)	---	120	3.7		2.4
11	270	12.6	235	---	120	---		4.0
12	280	13.0	(240)	---	120	---		2.3
13	270	13.3	(240)	---	125	---		2.2
14	270	14.0	(240)	---	120	---		2.1
15	270	14.4	235	---	130	3.9		2.2
16	250	14.4	240	---	120	3.4	3.9	2.1
17	250	14.4			130	3.0	3.8	2.1
18	290	14.0			140	2.3	2.1	2.1
19	380	12.7					3.3	2.0
20	410	12.4					2.0	(2.0)
21	340	13.6					2.1	(2.2)
22	296	14.7					2.0	(2.4)
23	250	14.6					3.1	(2.7)

Time: 157.5°W.

Sweep: 1.0 Mc to 13.0 Mc in 1 minute 36 seconds, automatic operation;  
13.0 Mc to 18.0 Mc, manual operation.

Table 11

Huancayo, Peru (12.0°S, 75.3°W)

April 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	230	8.9					5.0	2.9
01	230	8.0					4.8	2.9
02	240	7.2					4.6	3.0
03	240	6.6					3.2	3.0
04	240	5.7					2.8	3.0
05	235	5.0					2.8	3.1
06	270	6.6				1.7	2.8	3.0
07	250	10.2				2.7		3.0
08	230	12.5				3.4	8.4	2.8
09	---	13.6	230	---		3.8	11.0	2.5
10	270	13.8	220	6.5		4.0	11.0	2.3
11	---	13.0	210	---		4.0	11.9	2.2
12	(270)	12.5	210	5.5		4.1	11.6	2.2
13	(270)	12.6	210	5.5		4.0	10.9	2.2
14	(270)	12.8	210	5.4		3.9	10.8	2.2
15	---	12.8	210	---		3.6	10.8	2.2
16	240	12.4				3.2	10.7	2.1
17	270	12.3				2.5	8.4	2.1
18	330	11.6				1.3	2.8	2.1
19	420	9.8						2.0
20	385	9.2						2.2
21	235	9.9					2.7	2.4
22	240	9.6					3.0	2.6
23	230	8.6					4.8	2.8

Time: 75.0°W.

Sweep: 16.0 Mc to 0.5 Mc in 15 minutes, automatic operation.

Table 12

Lindau/Harz, Germany (51.6°N, 10.1°E)

March 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	305	6.5						
01	305	6.1						
02	305	5.8						
03	310	5.4						
04	315	5.1						
05	300	4.7						
06	300	4.6						
07	260	6.4			115	2.2		
08	260	8.0			105	2.5	2.3	
09	230	10.1			105	3.0	3.0	
10	230	10.7			105	3.2	3.4	
11	230	11.5			105	3.3	3.4	
12	230	12.0			105	3.4	3.5	
13	230	11.8			105	3.4	3.5	
14	240	12.1			106	3.4	3.4	
15	230	11.5			106	3.3	3.2	
16	250	11.2			105	3.0	2.9	
17	250	11.0			110	2.5	2.6	
18	260	10.6			115	2.0	2.5	
19	230	9.6						
20	230	8.5						
21	260	7.7						
22	290	6.9						
23	300	6.5						

Time: 15.0°E.

Sweep: 1.0 Mc to 16.0 Mc in 12 minutes.

Table 13

Johannesburg, Union of S. Africa (26.2°S, 28.0°E)

March 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	255	6.8					1.8	2.8
01	255	6.3					2.0	2.8
02	250	5.8					1.6	2.8
03	240	5.1						2.8
04	260	4.6					1.4	2.8
05	270	4.3					1.6	2.8
06	260	5.6			---	1.6		2.9
07	230	9.0			---	2.5		3.2
08	230	10.8	230	---	110	3.1	3.4	3.1
09	250	12.0	220	---	110	3.6	4.0	3.0
10	280	12.6	210	---	110	3.9	4.2	2.8
11	280	13.0	205	---	110	4.0	4.4	2.8
12	310	13.2	210	---	110	4.1	4.2	2.7
13	320	13.2	210	---	110	4.0		2.6
14	330	13.2	220	---	110	4.0	4.0	2.6
15	320	13.1	230	---	110	3.8		2.7
16	300	13.1	230	---	110	3.5	3.9	2.7
17	280	12.7	240	---	110	3.0	3.6	2.7
18	250	12.3			110	2.0	2.9	2.8
19	240	11.8			---	---	2.2	2.9
20	230	10.7					1.9	2.9
21	240	9.6					1.8	2.9
22	240	8.9					1.8	2.9
23	250	7.5					1.8	2.9

Time: 30.0°E.

Sweep: 1.0 Mc to 15.0 Mc in 7 seconds.

Table 14

Watheroo, W. Australia (30.3°S, 115.9°E)

March 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	280	6.9						2.8
01	295	6.6						3.2
02	290	6.2						3.0
03	280	5.8						3.0
04	290	5.6						3.0
05	290	5.4						3.0
06	262	5.8						2.8
07	235	8.5	240	4.2		1.8	2.8	3.2
08	248	9.8	230	5.0		3.0	3.3	3.1
09	248	10.4	230	5.1		3.4	3.9	2.9
10	295	10.9	220	5.5		3.7	4.2	2.8
11	300	11.5	220	6.0		3.8	4.2	2.7
12	310	11.9	225	5.8		3.8	4.3	2.7
13	320	11.8	225	6.0		3.9	4.5	2.7
14	320	11.7	230	6.0		3.8	4.3	2.6
15	310	11.7	230	6.0		3.7	4.2	2.7
16	300	11.7	238	5.6		3.3	3.8	2.7
17	250	11.1	235	4.8		2.9	3.8	2.7
18	245	10.7				2.2	3.3	2.8
19	240	10.0					3.0	2.8
20	250	8.8					2.9	2.8
21	260	8.3					3.0	2.7
22	250	7.5					3.0	2.7
23	275	7.2					2.9	2.7

Time: 120.0°E.

Sweep: 16.0 Mc to 0.5 Mc in 15 minutes, automatic operation.

Table 15

Capetown, Union of S. Africa (34.2°S, 18.3°E)

March 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	(255)	6.0						2.9
01	(260)	5.2						2.8
02	(280)	4.9						2.8
03	(270)	4.7						2.8
04	(280)	4.5						2.7
05	(290)	4.4						2.7
06	(280)	4.2						2.7
07	250	7.0			---	3.0		3.1
08	240	9.5	---	---	110	2.7		3.2
09	245	11.0	230	---	110	3.1		3.1
10	250	12.0	220	---	110	---	3.7	2.9
11	290	12.6	220	---	110	---	4.0	2.8
12	300	13.2	---	---	110	---		2.7
13	310	13.1	---	---	110	---		2.7
14	320	13.2	---	---	110	---		2.7
15	320	13.2	230	---	110	---		2.7
16	310	13.1	240	---	100	---		2.7
17	285	12.8	240	---	110	3.1		2.7
18	250	12.4	250	---	110	2.6		2.8
19	240	12.0			100	---		2.9
20	230	10.9			---	---	1.8	2.9
21	230	9.4					1.8	2.9
22	240	8.4						2.9
23	(240)	7.0						3.0

Time: 30.0°E.

Sweep: 1.0 Mc to 15.0 Mc in 7 seconds.

Table 16

Ouhungking, China (29.4°E, 106.8°E)

February 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	245	8.0						2.6
01	250	8.0						2.7
02	260	7.6						2.9
03	230	6.9						3.0
04	220	4.9						2.9
05	260	3.7						2.5
06	295	4.0						2.6
07	260	7.6	---	---	---	---	3.0	3.0
08	240	11.4	220	---	110	3.0	3.9	3.0
09	245	12.7	220	---	110	3.2	4.0	2.9
10	260	13.5	210	---	100	3.7	4.4	2.8
11	265	14.8	220	---	100	4.1	4.5	2.8
12	270	15.0	210	---	100	4.2	4.6	2.7
13	280	15.5	220	---	110	4.0	4.7	2.5
14	280	16.3	220	---	110	3.6	4.5	2.6
15	240	16.2	200	---	80	3.4	4.3	2.7
16	280	16.8	200	---	90	3.1	3.8	2.7
17	230	14.8	200	---	95	2.8	3.6	2.8
18	225	14.8			---	---	2.2	2.8
19	230	13.3						2.9
20	230	14.2						2.7
21	240	12.2						2.8
22	240	10.2						2.8
23	240	9.4						2.7

Time: 105.0°E.

Sweep: 1.5 Mc to 20.0 Mc in 15 minutes, manual operation.

Table 17

Delhi, India (28.6°N, 77.1°E)

February 1949

Time	*	f°F2	h'F1	f°F1	h'E	f°E	fEs	** F2-M3000
00		420	8.4					2.7
01		420	7.4					
02		---	---					
03		---	---					
04		(420)	(4.9)					2.9
05		400	4.8					
06		400	5.0					
07		360	8.2					
08		340	11.0					3.1
09		360	12.0					
10		380	12.6					
11		390	13.0					
12		400	13.4					2.6
13		440	13.4					
14		440	13.2					
15		440	13.6					
16		470	13.8					2.4
17		410	13.5					
18		420	13.4					
19		(410)	12.1					2.7
20		410	12.2					
21		470	11.4					
22		400	10.0					
23		400	8.6					

Time: Local.

Sweep: 1.8 Mc to 16.0 Mc in 5 minutes, manual operation.

\*Height at 0.83 f°F2.

\*\*Average values; other columns, median values.

Table 18

Bombay, India (19.0°N, 73.0°E)

February 1949

Time	*	f°F2	h'F1	f°F1	h'E	f°E	fEs	** F2-M3000
00								
01								
02								
03								
04								
05								
06								
07		330	9.5					
08		360	11.2					2.9
09		390	12.3					
10		(450)	(13.2)					
11		---	(13.8)					
12			(13.9)					
13			(14.1)					
14			(14.4)					
15			(14.3)					
16			(14.3)					
17			(14.3)					
18		---	(14.0)					
19		480	(14.0)					2.7
20		435	13.5					
21		420	13.2					2.9
22		(345)	(12.6)					
23		---	---					

Time: Local.

Sweep: 1.8 Mc to 16.0 Mc in 5 minutes, manual operation.

\*Height at 0.83 f°F2.

\*\*Average values; other columns, median values.

Table 19

Mayapur, India (23.0°N, 80.2°E)

February 1949

Time	*	f°F2	h'F1	f°F1	h'E	f°E	fEs	** F2-M3000
00								
01								
02								
03								
04								
05								
06								
07		430	9.6					
08		420	12.4					2.6
09		450	13.3					
10		540	(14.0)					
11		540	(14.0)					
12		540	12.9					2.3
13		540	12.8					
14		540	12.8					
15		540	12.7					2.2
16		540	12.7					
17		540	12.4					
18		540	11.9					
19		(540)	(11.0)					
20			(10.1)					
21			(10.0)					
22			(10.0)					
23								

Time: Local.

Sweep: 1.8 Mc to 16.0 Mc in 5 minutes, manual operation.

\*Height at 0.83 f°F2.

\*\*Average values; other columns, median values.

Table 20

Tiruchirappalli, India (10.6°N, 78.8°E)

February 1949

Time	*	f°F2	h'F1	f°F1	h'E	f°E	fEs	** F2-M3000
00								
01								
02								
03								
04								
05								
06								
07		(365)	(7.9)					
08		(400)	(11.3)					
09		(480)	(12.1)					
10		---	---					
11		---	---					
12		---	(11.6)					
13		---	(11.2)					
14		(600)	(11.2)					
15		---	(11.1)					
16		---	(10.9)					
17		(580)	(10.3)					
18		(600)	(9.8)					
19		(600)	(9.4)					
20		(720)	(8.8)					
21		---	(8.7)					
22		---	(9.0)					
23		---						

Time: Local.

Sweep: 1.8 Mc to 16.0 Mc in 5 minutes, manual operation.

\*Height at 0.83 f°F2.

Table 21

Watheroo, W. Australia (30.3°S, 115.9°E)

February 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	290	7.1					3.0	2.6
01	290	6.7					3.2	2.6
02	280	6.4					3.3	2.6
03	270	6.2					3.0	2.6
04	270	5.7					3.0	2.7
05	280	5.3					3.2	2.6
06	280	6.2			1.8	3.0	2.9	
07	260	7.6	230	---	2.7	3.3	3.0	
08	270	8.5	230	4.8	3.2	3.6	2.9	
09	290	9.2	230	5.3	3.6	4.6	2.8	
10	300	9.8	220	5.6	3.8	4.4	2.6	
11	300	10.4	220	5.3	3.9	4.4	2.7	
12	300	11.0	220	5.3	4.0	4.6	2.6	
13	315	10.8	225	5.4	3.8	4.4	2.6	
14	340	10.7	230	5.6	3.9	4.1	2.6	
15	335	10.6	240	5.6	3.8	4.0	2.6	
16	320	10.1	240	5.4	3.6	3.7	2.6	
17	290	10.0	250	5.1	3.2	3.3	2.7	
18	260	9.4			2.4	3.3	2.7	
19	260	9.0				2.8	2.8	
20	250	8.6				3.1	2.7	
21	270	8.1				2.8	2.6	
22	280	7.8				2.9	2.7	
23	290	7.4				2.9	2.6	

Time: 120.0°E.

Sweep: 16.0 Mc to 0.5 Mc in 15 minutes, automatic operation.

Table 22

Christchurch, New Zealand (43.5°S, 172.7°E)

February 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	300	7.6					2.7	2.4
01	300	7.5					2.7	2.5
02	310	6.7					2.7	2.4
03	300	6.4					2.8	2.5
04	290	6.2					2.9	2.5
05	290	5.6				1.2	3.5	2.7
06	260	6.4				1.6	4.4	2.8
07	250	7.4				2.7	4.8	2.8
08	250	8.2	235	(5.0)		3.3	5.2	2.8
09	300	8.4	230	(5.6)		3.5	5.0	2.7
10	340	8.7	230	5.7		3.7	6.4	2.7
11	370	8.8	---	5.9		3.7	5.2	2.7
12	375	8.9	230	6.0		3.7	5.4	2.6
13	385	9.0	240	6.0		3.8	5.8	2.6
14	395	9.0	---	6.0		3.7	6.2	2.6
15	350	9.2	250	5.8		3.6	4.7	2.6
16	250	9.0	250	5.6		3.5	4.0	2.6
17	250	9.0	250	(5.0)		3.1	4.3	2.7
18	270	9.1				2.6	4.0	2.7
19	280	9.1				1.5	3.9	2.6
20	270	8.7					3.9	2.5
21	280	8.6					4.2	2.5
22	300	8.2					3.1	2.4
23	300	8.0					2.8	2.4

Time: 172.5°E.

Sweep: 1.0 Mc to 13.0 Mc.

Table 23

Lanchow, China (36.1°N, 103.8°E)

January 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	440	3.6						2.3
01	460	3.9						2.2
02	440	3.8						2.2
03	400	3.8						2.3
04	380	3.8						2.4
05	400	3.6						2.3
06	400	3.6						2.4
07	360	4.5	345	---				2.4
08	315	8.5	290	---	150	---	3.0	2.7
09	320	10.0	300	---	---	---	3.2	2.6
10	320	11.5	300	---	140	3.5	4.0	2.6
11	340	13.0	300	---	140	3.7	4.1	2.6
12	340	13.5	300	---	---	---	4.4	2.5
13	320	13.0	300	---	---	---	4.3	2.5
14	320	13.0	300	---	---	---	4.2	2.5
15	320	12.6	300	---	---	---	4.2	2.4
16	310	11.5	300	---	---	---	3.3	2.5
17	315	10.5	285	---	---	---	2.6	2.5
18	315	8.2	280	---				2.6
19	300	7.8						2.5
20	300	7.4						2.5
21	310	5.3						2.4
22	400	4.0						2.3
23	440	3.5						2.2

Time: 105.0°E.

Sweep: 2.4 Mc to 16.0 Mc in 15 minutes, manual operation.

Table 24

Rarotonga I. (21.3°S, 159.8°W)

January 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00								
01								
02								
03								
04								
05								
06	280	8.8	---	---	---	1.8	3.2	2.7
07	250	9.7	---	---	115	2.7	4.2	3.0
08	245	9.6	---	---	110	3.3	5.2	2.7
09	265	10.3	230	5.8	110	3.6	4.8	2.6
10	360	12.1	230	6.0	110	3.8	5.7	2.6
11	370	12.9	255	5.9	110	3.9	5.2	2.5
12	380	13.4	240	6.6	110	4.0		2.6
13	380	14.3	250	6.4	110	4.0	5.3	2.6
14	370	14.4	250	6.3	110	4.0		2.6
15	350	14.1	240	5.9	110	3.9	5.6	2.6
16	340	13.3	250	5.6	110	2.8	5.3	2.7
17	330	11.9	250	5.9	110	3.2	5.6	2.7
18	270	10.9	---	---	120	2.7	5.2	2.6
19	290	10.4			---	1.8	4.0	2.4
20	350	10.0			---	---	5.4	2.4
21	350	10.2					3.9	2.4
22								
23								

Time: 157.5°W.

Sweep: 2.0 Mc to 16.0 Mc, manual operation.

Table 25

Brisbane, Australia (27.5°S, 153.0°E)

January 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	280	9.0					5.0	2.6
01	290	8.4					4.6	2.6
02	300	8.0					4.5	2.6
03	290	7.8					3.7	2.7
04	280	7.4					3.4	2.6
05	260	7.1			---	1.7	3.0	2.8
06	250	7.5	---	---	110	2.6	4.0	2.9
07	250	7.5	235	5.0	100	3.1		2.8
08	360	8.0	240	5.4	100	3.5		2.7
09	350	9.4	220	5.8	100	3.8		2.7
10	360	10.0	230	6.0	100	4.0	5.1	2.6
11	360	10.2	220	6.0	---	---	7.2	2.6
12	375	10.6	230	6.0	---	(4.1)	6.4	2.5
13	365	10.4	230	5.8	100	4.2	5.5	2.5
14	350	10.3	230	5.8	105	4.0	3.4	2.6
15	340	10.4	240	6.5	110	3.8	3.9	2.7
16	310	10.0	220	5.2	100	3.5	3.8	2.7
17	280	9.2	240	5.0	100	3.1		2.7
18	265	8.8	---	---	---	---	4.5	2.7
19	270	8.1			---	---	4.0	2.6
20	300	8.5					4.0	2.6
21	310	9.0					3.5	2.6
22	310	9.2					3.7	2.6
23	300	9.6					5.5	2.6

Time: 150.0°E.

Sweep: 1.0 Mc to 16.0 Mc in 1 minute 55 seconds.

Table 26

Canberra, Australia (35.3°S, 149.0°E)

January 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	275	7.8						3.9
01	270	7.4						3.0
02	270	6.9						3.4
03	290	6.4						3.3
04	270	5.9						2.9
05	260	5.6			105	1.4		2.7
06	240	6.4	---	---	100	2.4		3.1
07	250	7.1	218	4.5	100	3.0		3.0
08	295	7.2	240	5.1	100	3.4		3.0
09	350	7.8	210	5.4	100	3.6		2.8
10	350	8.3	200	5.5	100	3.9		2.8
11	350	8.2	200	5.8	100	4.0		2.8
12	360	8.2	210	5.7	100	4.0		2.7
13	380	8.2	210	5.7	100	4.0		2.7
14	380	8.3	200	5.6	100	3.9		2.7
15	350	8.2	210	5.4	100	3.8		2.7
16	350	8.2	230	5.3	100	3.6		2.8
17	300	8.1	230	4.9	100	3.3		2.8
18	240	8.0			100	2.7		2.8
19	250	7.9			100	1.8		2.8
20	250	7.9						3.4
21	290	7.9						3.2
22	300	7.9						3.9
23	290	8.0						3.4

Time: 150.0°E.

Sweep: 1.0 Mc to 16.0 Mc in 1 minute 55 seconds.

Table 27

Fribourg, Germany (48.1°N, 7.8°E)

December 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	320	3.6						(2.6)
01	320	3.4						2.6
02	310	3.6						2.6
03	302	3.4						2.8
04	270	3.0						2.8
05	280	3.0						2.7
06	250	2.9						2.8
07	260	3.9						2.8
08	220	7.2						3.3
09	220	9.7			120	2.3	2.9	(3.2)
10	220	11.2			115	2.7	3.0	(3.2)
11	230	(11.4)			110	2.9		(3.2)
12	230	(11.7)			110	3.0	3.2	(3.1)
13	225	(11.4)			120	2.9	3.2	(3.2)
14	225	(11.2)			120	2.6	3.2	(3.2)
15	220	10.6			120	2.2	3.2	(3.0)
16	210	8.9				E	3.2	(3.2)
17	215	7.2					2.6	(3.0)
18	220	6.0					2.0	(3.0)
19	230	4.8					2.7	3.0
20	240	3.7					2.7	3.0
21	275	3.3					2.3	2.8
22	310	3.3						(2.6)
23	315	3.4					2.1	2.6

Time: 10.01.

Sweep: 1.6 Mc to 17.6 Mc in 10 minutes, automatic operation.



Table 28

Fribourg, Germany (48.1°N, 7.8°E)

November 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	310	4.2						(2.6)
01	310	4.0						2.7
02	305	4.1						2.6
03	298	3.9						2.7
04	268	3.4						2.9
05	260	3.0						2.9
06	265	3.1						2.7
07	240	6.0						(2.8)
08	220	8.9			120	2.1	2.3	3.1
09	225	10.8			115	2.7	2.8	(3.2)
10	220	11.6			110	2.9	3.6	(3.1)
11	225	(12.0)	230		110	3.1	3.4	(3.0)
12	226	(12.1)			110	3.2		(3.0)
13	230	(11.9)	225		105	3.1		3.0
14	230	(12.0)			110	2.9	1.9	3.0
15	230	(11.7)			120	2.5	3.2	3.0
16	220	(10.8)			130	1.8	3.2	(3.1)
17	220	(9.4)					2.6	(3.0)
18	220	7.8					1.9	3.1
19	220	(6.7)						(3.1)
20	240	4.8						2.9
21	270	4.3					2.1	2.6
22	290	4.4						2.6
23	310	4.2						(2.6)

Time: Local.

Sweep: 1.6 Mc to 17.6 Mc in 10 minutes, automatic operation.

Table 29

Fribourg, Germany (48.1°N, 7.8°E)

October 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	320	5.0						2.5
01	310	4.8						(2.5)
02	310	4.7						2.5
03	320	4.6						2.6
04	300	4.3						2.7
05	290	4.2						2.6
06	275	4.4						2.8
07	242	(7.0)			130	2.0	2.3	(3.0)
08	240	(8.7)	250		115	2.6	2.9	3.0
09	240	(10.2)	230		110	2.9	4.0	(3.0)
10	230	(11.0)	230		110	3.2	4.2	(3.0)
11	250	(11.6)	220		110	3.2	4.0	(2.9)
12	240	(11.4)	230		110	3.3	4.2	(2.9)
13	235	11.4	230		110	3.3	3.7	2.8
14	245	(11.5)	235		110	3.1	3.6	(2.8)
15	250	(11.7)	240		110	2.9	3.6	2.9
16	240	(11.2)			110	2.4	3.2	(2.9)
17	240	10.8					3.2	(3.0)
18	230	(9.4)					2.8	(3.2)
19	230	(8.0)					2.8	(3.0)
20	240	6.0					2.6	2.8
21	255	5.4						2.6
22	290	(5.3)						(2.6)
23	310	4.9						(2.5)

Time: Local.

Sweep: 1.6 Mc to 17.6 Mc in 10 minutes, automatic operation.

TABLE 30  
Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

hF2 \_\_\_\_\_ Km \_\_\_\_\_ May \_\_\_\_\_ 1949  
(Miles) (Miles)  
Observed at \_\_\_\_\_ Washington, D. C.  
National Bureau of Standards  
(Institution)  
Scaled by: E.J.W., J.J.S., J.M.C.  
Calculated by: E.J.W., J.J.S., L.A.L.

IONOSPHERIC DATA

Calculated by: E.J.W., U.S.S., L.A.L.																								
75°W																								
Mean Time																								
Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	270	280	290	295	290	285	280	283	280	278	270	265	250	235	220	205	190	175	160	145	130	115	100	85
2	300	290	280	280	300	310	280	280	280	280	290	G	500	480	450	420	390	370	350	330	310	290	270	250
3	300	300	280	270	280	280	280	300	300	300	290	280	270	260	250	240	230	220	210	200	190	180	170	160
4	300	290	280	280	290	280	280	300	300	300	G	600	B	B	430	390	360	340	320	300	280	260	240	220
5	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
6	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
7	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
8	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
9	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
10	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
11	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
12	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
13	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
14	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
15	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
16	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
17	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
18	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
19	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
20	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
21	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
22	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
23	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
24	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
25	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
26	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
27	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
28	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
29	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
30	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
31	300	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
Median	290	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
Count	31	31	31	30	30	30	30	30	30	31	31	31	30	30	30	31	31	31	30	30	30	29	29	30

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	(77) <sup>2</sup>	75	71	66	62	61	72	86	94	(94) <sup>1</sup>	100	101	103	103	103	103	101	(102) <sup>2</sup>	99	92	90	80	71	72
2	(76) <sup>2</sup>	(75)	68	63	57	54	57 <sup>1</sup>	58 <sup>1</sup>	59 <sup>1</sup>	60 <sup>1</sup>	62 <sup>1</sup>	65 <sup>1</sup>	(63) <sup>1</sup>	68 <sup>1</sup>	66 <sup>1</sup>	69 <sup>1</sup>	69 <sup>1</sup>	70 <sup>1</sup>	70 <sup>1</sup>	69 <sup>1</sup>	69 <sup>1</sup>	67 <sup>1</sup>	67	
3	65	65	65	66	64	64	175 <sup>1</sup>	80	82	80	77	78	79	[81] <sup>1</sup>	83	83	85	84	71	79	(83) <sup>1</sup>	[80] <sup>1</sup>	71	
4	71	58 <sup>1</sup>	48 <sup>1</sup>	49 <sup>1</sup>	49 <sup>1</sup>	(45) <sup>1</sup>	49 <sup>1</sup>	53 <sup>1</sup>	(48) <sup>1</sup>	55 <sup>1</sup>	(51) <sup>1</sup>	64 <sup>1</sup>	B <sup>1</sup>	B <sup>1</sup>	76 <sup>1</sup>	75 <sup>1</sup>	77 <sup>1</sup>	74 <sup>1</sup>	A <sup>1</sup>	71 <sup>1</sup>	69 <sup>1</sup>	67	65	
5	63	62 <sup>1</sup>	60 <sup>1</sup>	58 <sup>1</sup>	55 <sup>1</sup>	59 <sup>1</sup>	(73) <sup>1</sup>	76	80 <sup>1</sup>	86	88	94	95	99	99	102	99	(99) <sup>1</sup>	(98) <sup>1</sup>	85	(79) <sup>1</sup>	73	(71) <sup>1</sup>	
6	71	67	62	58	52	49	57	63	64	(65) <sup>1</sup>	(73) <sup>1</sup>	76	82	89	81	90	92	94	89	88	81	80	71	69
7	68	68	69	66	59	53	65	79	91	96	97	99	105	104	102	104	104	103	99	100	95	88	83	75
8	73	64	63	64	62	61	67	71	75	77	78	80	80	79	77	74	77	75	77	83	83	76	64	64
9	62	58	56 <sup>1</sup>	47 <sup>1</sup>	41 <sup>1</sup>	(44) <sup>1</sup>	54 <sup>1</sup>	(59) <sup>1</sup>	63 <sup>1</sup>	63 <sup>1</sup>	71 <sup>1</sup>	73 <sup>1</sup>	73 <sup>1</sup>	75	73 <sup>1</sup>	72 <sup>1</sup>	73 <sup>1</sup>	74 <sup>1</sup>	72	73 <sup>1</sup>	74 <sup>1</sup>	70 <sup>1</sup>	67	63 <sup>1</sup>
10	62	61 <sup>1</sup>	55 <sup>1</sup>	53 <sup>1</sup>	49 <sup>1</sup>	50 <sup>1</sup>	63	72 <sup>1</sup>	80	81 <sup>1</sup>	[83] <sup>1</sup>	93	96	99	98	98	100	98	(98) <sup>1</sup>	98	91	86	78 <sup>1</sup>	(75) <sup>1</sup>
11	82	76	70	65 <sup>1</sup>	49 <sup>1</sup>	42 <sup>1</sup>	43 <sup>1</sup>	(42) <sup>1</sup>	54 <sup>1</sup>	56 <sup>1</sup>	65 <sup>1</sup>	68 <sup>1</sup>	69 <sup>1</sup>	67 <sup>1</sup>	71 <sup>1</sup>	71 <sup>1</sup>	72	72 <sup>1</sup>	73 <sup>1</sup>	72 <sup>1</sup>	69 <sup>1</sup>	63 <sup>1</sup>	62 <sup>1</sup>	
12	58 <sup>1</sup>	56 <sup>1</sup>	58 <sup>1</sup>	43 <sup>1</sup>	(23) <sup>1</sup>	38 <sup>1</sup>	48 <sup>1</sup>	(41) <sup>1</sup>	(43) <sup>1</sup>	(44) <sup>1</sup>	(43) <sup>1</sup>	43 <sup>1</sup>	45 <sup>1</sup>	(48) <sup>1</sup>	(47) <sup>1</sup>	55 <sup>1</sup>	56 <sup>1</sup>	(51) <sup>1</sup>	47 <sup>1</sup>	(47) <sup>1</sup>	39 <sup>1</sup>	35 <sup>1</sup>	31 <sup>1</sup>	27 <sup>1</sup>
13	31 <sup>1</sup>	33 <sup>1</sup>	35 <sup>1</sup>	32 <sup>1</sup>	30 <sup>1</sup>	39 <sup>1</sup>	53 <sup>1</sup>	65 <sup>1</sup>	73	71	69	73	75	79	81	83	87	87	88	89	84	72	69	67
14	66 <sup>1</sup>	63 <sup>1</sup>	58 <sup>1</sup>	38 <sup>1</sup>	37 <sup>1</sup>	41 <sup>1</sup>	52 <sup>1</sup>	55 <sup>1</sup>	60 <sup>1</sup>	59 <sup>1</sup>	63 <sup>1</sup>	64 <sup>1</sup>	66 <sup>1</sup>	71	72 <sup>1</sup>	76 <sup>1</sup>	77 <sup>1</sup>	78 <sup>1</sup>	82	86	86	81	73	70
15	71	70	69	64 <sup>1</sup>	54 <sup>1</sup>	55	62 <sup>1</sup>	64 <sup>1</sup>	73	70	76	81	85	86	89	90	90	93	93	91	86	76	72	70
16	67	58 <sup>1</sup>	58 <sup>1</sup>	57 <sup>1</sup>	49 <sup>1</sup>	58 <sup>1</sup>	63 <sup>1</sup>	66	(64) <sup>1</sup>	75	10	70	83	78	82	81	78	72	73	72	(74) <sup>1</sup>	78	(77) <sup>1</sup>	70
17	64 <sup>1</sup>	56 <sup>1</sup>	56 <sup>1</sup>	(43) <sup>1</sup>	42 <sup>1</sup>	47	54	60	62	(60) <sup>1</sup>	63	65	72	74	81	85	87	87	88	83	79	75	69 <sup>1</sup>	65 <sup>1</sup>
18	63 <sup>1</sup>	62 <sup>1</sup>	59 <sup>1</sup>	57 <sup>1</sup>	54 <sup>1</sup>	57	69	77	83 <sup>1</sup>	86 <sup>1</sup>	84	88	88	90	93	91	95	93	(95) <sup>1</sup>	91	80	74	71	
19	(71) <sup>1</sup>	67	63	60	56	58	70	78 <sup>1</sup>	85	83	81	84	90	89	89	90	90	91	93	92	90	81	75	71
20	70	69	70	62	58	61	73	92	101	100	100	101	103	102	100	98	100	99	97	97	93	86	82	79
21	73	70	64	65	64	65	78	84 <sup>1</sup>	95	96	95	96	96	92	92	94	89	91	93	94	89	79	73	66
22	66	63	60	59	54	54	64	67 <sup>1</sup>	80	81	86	87	89	89	83	90	87	92	96	95	(93) <sup>1</sup>	82	(72) <sup>1</sup>	68
23	63	58 <sup>1</sup>	49 <sup>1</sup>	50 <sup>1</sup>	43 <sup>1</sup>	43 <sup>1</sup>	53 <sup>1</sup>	60 <sup>1</sup>	60 <sup>1</sup>	60 <sup>1</sup>	60 <sup>1</sup>	64 <sup>1</sup>	65 <sup>1</sup>	68 <sup>1</sup>	65 <sup>1</sup>	67 <sup>1</sup>	68 <sup>1</sup>	70 <sup>1</sup>	70 <sup>1</sup>	73 <sup>1</sup>	73 <sup>1</sup>	77	75	78
24	71	68 <sup>1</sup>	59 <sup>1</sup>	C	C	C	C	C	C	83	90	93	92	93	89	90	89	94	94	94	90	[82] <sup>1</sup>	78 <sup>1</sup>	73
25	71	66	63	54	49	49	58	58 <sup>1</sup>	(62) <sup>1</sup>	70	70	72	73	71	73	73	74	76	79	80	82	76	70	70
26	68	67	64	63	(59) <sup>1</sup>	57	63	63	68 <sup>1</sup>	66	(73) <sup>1</sup>	74	77	80	80	78	80	80	82	82	82	77	74	72
27	70	68	65	58	(58) <sup>1</sup>	57	67	86	92	93	103	98	100	98	97	92	95	94	94	93	88	78	73	(71) <sup>1</sup>
28	71	70	67	60	53	52	58 <sup>1</sup>	63 <sup>1</sup>	64 <sup>1</sup>	67 <sup>1</sup>	65 <sup>1</sup>	64 <sup>1</sup>	65 <sup>1</sup>	63 <sup>1</sup>	64 <sup>1</sup>	65 <sup>1</sup>	65 <sup>1</sup>	66 <sup>1</sup>	68 <sup>1</sup>	70 <sup>1</sup>	67 <sup>1</sup>	65 <sup>1</sup>	64 <sup>1</sup>	
29	63	61	58	58 <sup>1</sup>	51 <sup>1</sup>	57 <sup>1</sup>	68	80	86	85	89	95	90	88	86	87	87	89	89	88	84	78	72	73
30	69	67	66	66	59	59	66	76	83	87	87	(86) <sup>1</sup>	85	89	92	93	94	99	104 <sup>1</sup>	89 <sup>1</sup>	(109) <sup>1</sup>	92 <sup>1</sup>	66 <sup>1</sup>	59 <sup>1</sup>
31	56 <sup>1</sup>	50 <sup>1</sup>	(35) <sup>1</sup>	31 <sup>1</sup>	31 <sup>1</sup>	39 <sup>1</sup>	44 <sup>1</sup>	48 <sup>1</sup>	51 <sup>1</sup>	54 <sup>1</sup>	(50) <sup>1</sup>	56 <sup>1</sup>	61 <sup>1</sup>	60 <sup>1</sup>	63 <sup>1</sup>	64 <sup>1</sup>	66 <sup>1</sup>	65 <sup>1</sup>	69 <sup>1</sup>	77 <sup>1</sup>	78 <sup>1</sup>	71 <sup>1</sup>	(74) <sup>1</sup>	65 <sup>1</sup>
Median	68	65	63	58	54	54	63	66	70	71	76	78	82	84	83	85	87	87	88	88	84	78	72	70
Count	31	31	31	30	30	30	30	30	30	31	31	31	30	30	31	31	31	31	30	30	31	31	31	31

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒



TABLE 32  
Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D C

# IONOSPHERIC DATA

National Bureau of Standards  
(Institution)

foF2 Mc May 1949  
(Unit) (Month)

Washington, D. C.

Scaled by: E.J.W., J.J.S., J.M.C.

Observed at Lat. 39°0'N Long. 77°5'W

75°W

Mean Time

Calculated by: E.J.W., J.J.S., L.A.L.

Day	0030	0130	0230	0330	0430	0530	0630	0730	0830	0930	1030	1130	1230	1330	1430	1530	1630	1730	1830	1930	2030	2130	2230	2330
1	77	73	69	64	60	56	52	48	44	40	36	32	28	24	20	16	12	8	4	0	36	42	48	54
2	72	68	64	60	56	52	48	44	40	36	32	28	24	20	16	12	8	4	0	36	42	48	54	60
3	65	61	57	53	49	45	41	37	33	29	25	21	17	13	9	5	1	0	0	36	42	48	54	60
4	67	63	59	55	51	47	43	39	35	31	27	23	19	15	11	7	3	0	0	36	42	48	54	60
5	63	59	55	51	47	43	39	35	31	27	23	19	15	11	7	3	0	0	0	36	42	48	54	60
6	71	67	63	59	55	51	47	43	39	35	31	27	23	19	15	11	7	3	0	36	42	48	54	60
7	69	65	61	57	53	49	45	41	37	33	29	25	21	17	13	9	5	1	0	36	42	48	54	60
8	67	63	59	55	51	47	43	39	35	31	27	23	19	15	11	7	3	0	0	36	42	48	54	60
9	60	56	52	48	44	40	36	32	28	24	20	16	12	8	4	0	0	0	0	36	42	48	54	60
10	61	57	53	49	45	41	37	33	29	25	21	17	13	9	5	1	0	0	0	36	42	48	54	60
11	80	76	72	68	64	60	56	52	48	44	40	36	32	28	24	20	16	12	8	4	0	36	42	48
12	58	54	50	46	42	38	34	30	26	22	18	14	10	6	2	0	0	0	0	36	42	48	54	60
13	29	35	41	47	53	59	65	71	77	83	89	95	101	107	113	119	125	131	137	143	149	155	161	167
14	63	59	55	51	47	43	39	35	31	27	23	19	15	11	7	3	0	0	0	36	42	48	54	60
15	70	66	62	58	54	50	46	42	38	34	30	26	22	18	14	10	6	2	0	36	42	48	54	60
16	63	59	55	51	47	43	39	35	31	27	23	19	15	11	7	3	0	0	0	36	42	48	54	60
17	60	56	52	48	44	40	36	32	28	24	20	16	12	8	4	0	0	0	0	36	42	48	54	60
18	62	58	54	50	46	42	38	34	30	26	22	18	14	10	6	2	0	0	0	36	42	48	54	60
19	70	66	62	58	54	50	46	42	38	34	30	26	22	18	14	10	6	2	0	36	42	48	54	60
20	69	65	61	57	53	49	45	41	37	33	29	25	21	17	13	9	5	1	0	36	42	48	54	60
21	72	68	64	60	56	52	48	44	40	36	32	28	24	20	16	12	8	4	0	36	42	48	54	60
22	65	61	57	53	49	45	41	37	33	29	25	21	17	13	9	5	1	0	0	36	42	48	54	60
23	61	57	53	49	45	41	37	33	29	25	21	17	13	9	5	1	0	0	0	36	42	48	54	60
24	66	62	58	54	50	46	42	38	34	30	26	22	18	14	10	6	2	0	0	36	42	48	54	60
25	68	64	60	56	52	48	44	40	36	32	28	24	20	16	12	8	4	0	0	36	42	48	54	60
26	66	62	58	54	50	46	42	38	34	30	26	22	18	14	10	6	2	0	0	36	42	48	54	60
27	67	63	59	55	51	47	43	39	35	31	27	23	19	15	11	7	3	0	0	36	42	48	54	60
28	71	67	63	59	55	51	47	43	39	35	31	27	23	19	15	11	7	3	0	36	42	48	54	60
29	61	57	53	49	45	41	37	33	29	25	21	17	13	9	5	1	0	0	0	36	42	48	54	60
30	64	60	56	52	48	44	40	36	32	28	24	20	16	12	8	4	0	0	0	36	42	48	54	60
31	50	46	42	38	34	30	26	22	18	14	10	6	2	0	0	0	0	0	0	36	42	48	54	60
Median	66	64	60	56	54	58	65	79	93	107	121	135	149	163	177	191	205	219	233	247	261	275	289	303
Count	31	31	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

# TABLE 33 Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D.C.

HFI \_\_\_\_\_ Km \_\_\_\_\_  
(Characteristic) (Unit) (Month)

1949

Observed at Washington, D.C.

Lat. 39.0°N Long. 77.5°W

National Bureau of Standards  
(Institution)

Scaled by: E.J.W., J.J.S., J.M.C.

Calculated by: E.J.W., L.A.L., J.J.S.

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								Q	Q	Q	220	Q	210	220	250	Q	230	Q						
2								Q	200 <sup>K</sup>	190 <sup>K</sup>	230 <sup>K</sup>	210 <sup>K</sup>	250 <sup>K</sup>	220 <sup>K</sup>	230 <sup>K</sup>	230 <sup>K</sup>	240 <sup>K</sup>	(240) <sup>K</sup>						
3								Q	230	230	230	230	250	A	A	250	A	Q	270					
4								230 <sup>K</sup>	230 <sup>K</sup>	200 <sup>K</sup>	(240) <sup>K</sup>	230 <sup>K</sup>	B <sup>K</sup>	B <sup>K</sup>	A <sup>K</sup>	A <sup>K</sup>	A <sup>K</sup>	A <sup>K</sup>						
5								Q	Q	200	230	230	200	230	220	230	210	220	Q					
6								250	230	220	200	200	200	200	220 <sup>M</sup>	230	230	Q	Q					
7								Q	Q	Q	210	200	200	200	S	210	Q	Q	Q					
8								Q	Q	210	200	B	(220) <sup>B</sup>	B	220	220	240	Q	Q					
9								Q <sup>K</sup>	220 <sup>K</sup>	200 <sup>K</sup>	210 <sup>K</sup>	210 <sup>K</sup>	230 <sup>K</sup>	220 <sup>K</sup>	220 <sup>K</sup>	220 <sup>K</sup>	220 <sup>K</sup>	230 <sup>K</sup>	Q <sup>K</sup>					
10								Q	220	210	C	200	200	200	A	220	S	240						
11								270 <sup>K</sup>	250 <sup>K</sup>	230 <sup>K</sup>	200 <sup>K</sup>	210 <sup>K</sup>	200 <sup>K</sup>	240 <sup>K</sup>	230 <sup>K</sup>	200	200 <sup>K</sup>	230 <sup>K</sup>						
12								230 <sup>K</sup>	210 <sup>K</sup>	230 <sup>K</sup>	240 <sup>K</sup>	230 <sup>K</sup>	200 <sup>K</sup>	200 <sup>K</sup>	250 <sup>K</sup>	240 <sup>K</sup>	250 <sup>K</sup>	250 <sup>K</sup>	260 <sup>K</sup>					
13								220	230	A	200	200	210	200	220	210	230	230	230					
14								Q <sup>K</sup>	200 <sup>K</sup>	210 <sup>K</sup>	200 <sup>K</sup>	200 <sup>K</sup>	200 <sup>K</sup>	230 <sup>K</sup>	210 <sup>K</sup>	210 <sup>K</sup>	230	(260) <sup>K</sup>						
15								Q	200	200	230	210	(230) <sup>S</sup>	S	A	A	A	A						
16								Q	Q	200	200	A	(230) <sup>S</sup>	220	240	(230) <sup>S</sup>	240	A	A					
17								230	210	240	200	200 <sup>M</sup>	(250) <sup>K</sup>	200	220	220	230	240	Q					
18								Q	220	210	200	190	200 <sup>M</sup>	B	210	230	220	Q	230					
19								Q	200 <sup>H</sup>	200 <sup>H</sup>	200	200	(200) <sup>H</sup>	200	230	240	220	230	Q					
20								Q	200	Q	200	190	230	220	220	230	230	Q	Q					
21								Q	A	230	230	210	220	200	230	(240) <sup>K</sup>	A							
22								M	M	M	M	M	M	220	210	(230) <sup>S</sup>	230	A	A					
23								A <sup>K</sup>	A <sup>K</sup>	210 <sup>K</sup>	200 <sup>K</sup>	200 <sup>K</sup>	200 <sup>K</sup>	(230) <sup>S</sup>	220 <sup>K</sup>	210 <sup>K</sup>	230 <sup>K</sup>	240 <sup>K</sup>	A <sup>K</sup>					
24								C	C	A	A	(230) <sup>S</sup>	200	270	230	210	240	Q	Q					
25								230	(210) <sup>A</sup>	230 <sup>M</sup>	(210) <sup>S</sup>	230	200	200	210	200	230	210	Q					
26								Q	230	230	200	200	A	200	200	230	230	220	A					
27								240	240	220	210	200	210	210	(230) <sup>K</sup>	210	230	230	240					
28								Q	210 <sup>K</sup>	200 <sup>K</sup>	210 <sup>K</sup>	200 <sup>K</sup>	200 <sup>K</sup>	200 <sup>K</sup>	220 <sup>K</sup>	230 <sup>K</sup>	230 <sup>K</sup>	250 <sup>K</sup>	240 <sup>K</sup>					
29								Q	Q	220	200	200	200	250	200	230	230	Q	Q					
30								Q	230	230	220	200	250	230	200	B	220	240	Q <sup>K</sup>					
31								230 <sup>K</sup>	220 <sup>K</sup>	(220) <sup>K</sup>	200 <sup>K</sup>	190 <sup>K</sup>	220 <sup>K</sup>	220 <sup>K</sup>	210 <sup>K</sup>	220 <sup>K</sup>	240 <sup>K</sup>	220 <sup>K</sup>	Q <sup>K</sup>					
Median								—	230	220	210	200	200	210	215	220	220	230	240					
Count								2	11	21	25	26	29	26	26	28	26	19	6					

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒



Form adopted June 1946

TABLE 34  
Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

# IONOSPHERIC DATA

foF<sub>2</sub> (Frequency)  
Observed at Washington, D. C.  
Lat 39.0°N Long 77.5°W

Mc. May 1949  
(Month)

National Bureau of Standards  
(Institution)  
Scaled by E. J. W., J. J. S., J. M. G.  
Calculated by E. J. W., L. A. L., J. J. S.

Calculated by: E.J.W., L.A.L., J.J.S.																								
75°W																								
Mean Time																								
19	20	21	22	23	16	17	18	19	20	21	22	23	14	15	16	17	18	19	20	21	22	23	14	15
1																								
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								
11																								
12																								
13																								
14																								
15																								
16																								
17																								
18																								
19																								
20																								
21																								
22																								
23																								
24																								
25																								
26																								
27																								
28																								
29																								
30																								
31																								
Median																								
Count																								

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

U. S. GOVERNMENT PRINTING OFFICE: 1946 O-702119

TABLE 35

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

Form adopted June 1946

h'E \_\_\_\_\_ Km \_\_\_\_\_ 1949  
(Characteristic) (Unit) (Month)

Observed at \_\_\_\_\_  
Washington, D. C.

## IONOSPHERIC DATA

National Bureau of Standards  
(Institution)

Scaled by: E.J.W., J.J.S., J.M.C.

Calculated by: E.J.W., L.A.L., J.J.S.

Lat 39.0°N Long 77.5°W

75°W Mean Time

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							120	110	100	100	100	100	100	100	100	100	100	100	100	100				
2							120	110	100	100	100	100	100	100	100	100	100	100	100	100				
3							130	100	100	100	100	100	100	100	100	100	100	100	100	100				
4							120	100	100	100	100	100	100	100	100	100	100	100	100	100				
5							120	100	100	100	100	100	100	100	100	100	100	100	100	100				
6							120	100	100	100	100	100	100	100	100	100	100	100	100	100				
7							120	110	100	100	100	100	100	100	100	100	100	100	100	100				
8							110	100	100	100	100	100	100	100	100	100	100	100	100	100				
9							130	100	100	100	100	100	100	100	100	100	100	100	100	100				
10							130	100	100	100	100	100	100	100	100	100	100	100	100	100				
11							120	100	100	100	100	100	100	100	100	100	100	100	100	100				
12							120	100	100	100	100	100	100	100	100	100	100	100	100	100				
13							120	100	100	100	100	100	100	100	100	100	100	100	100	100				
14							110	100	100	100	100	100	100	100	100	100	100	100	100	100				
15							120	100	100	100	100	100	100	100	100	100	100	100	100	100				
16							130	100	100	100	100	100	100	100	100	100	100	100	100	100				
17							A	110	100	100	100	100	100	100	100	100	100	100	100	100				
18							100	100	100	100	100	100	100	100	100	100	100	100	100	100				
19							120	100	100	100	100	100	100	100	100	100	100	100	100	100				
20							120	100	100	100	100	100	100	100	100	100	100	100	100	100				
21							120	100	100	100	100	100	100	100	100	100	100	100	100	100				
22							110	100	100	100	100	100	100	100	100	100	100	100	100	100				
23							130	100	100	100	100	100	100	100	100	100	100	100	100	100				
24							C	C	C	C	C	C	C	C	C	C	C	C	C	C				
25							120	100	100	100	100	100	100	100	100	100	100	100	100	100				
26							120	100	100	100	100	100	100	100	100	100	100	100	100	100				
27							110	100	100	100	100	100	100	100	100	100	100	100	100	100				
28							120	100	100	100	100	100	100	100	100	100	100	100	100	100				
29							110	100	100	100	100	100	100	100	100	100	100	100	100	100				
30							120	100	100	100	100	100	100	100	100	100	100	100	100	100				
31							120	100	100	100	100	100	100	100	100	100	100	100	100	100				
Median							120	100	100	100	100	100	100	100	100	100	100	100	100	100				
Count							4	29	30	31	30	30	27	29	30	30	30	30	30	30				

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

TABLE 36  
Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

IONOSPHERIC DATA

National Bureau of Standards  
(Institution)  
Scaled by: J.J.S., E.J.W., J.M.C.  
Calculated by: E.J.W., L.A.L., J.J.S.

foE (Characteristics) Mc (Unit) May 1949  
Observed at Washington, D. C.  
Lat 39.0°N Long 77.5°W

EJW, LAL, JJS																								
Calculated by:																								
75°W																								
Mean Time																								
Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							23 <sup>M</sup>	29 <sup>K</sup>	32 <sup>M</sup>	33 <sup>K</sup>	35 <sup>K</sup>	39 <sup>K</sup>	39 <sup>K</sup>	37 <sup>M</sup>	39 <sup>K</sup>	37 <sup>K</sup>	33 <sup>K</sup>	31 <sup>K</sup>	23 <sup>K</sup>					
2							20 <sup>K</sup>	29 <sup>K</sup>	32 <sup>M</sup>	33 <sup>K</sup>	[36] <sup>K</sup>	39 <sup>K</sup>	38 <sup>K</sup>	37 <sup>K</sup>	37 <sup>K</sup>	34 <sup>K</sup>	33 <sup>K</sup>	29 <sup>K</sup>	23 <sup>K</sup>					
3							23 <sup>M</sup>	29 <sup>M</sup>	31 <sup>K</sup>	35 <sup>K</sup>	(36) <sup>S</sup>	37 <sup>K</sup>	(35) <sup>A</sup>	37 <sup>K</sup>	(35) <sup>A</sup>	37 <sup>K</sup>	34 <sup>K</sup>	30 <sup>K</sup>	23 <sup>K</sup>					
4							23 <sup>K</sup>	28 <sup>K</sup>	31 <sup>K</sup>	34 <sup>K</sup>	(34) <sup>K</sup>	(39) <sup>K</sup>	38 <sup>K</sup>	38 <sup>K</sup>	38 <sup>K</sup>	37 <sup>K</sup>	35 <sup>K</sup>	31 <sup>K</sup>	23 <sup>K</sup>					
5							23 <sup>M</sup>	[28] <sup>B</sup>	34 <sup>K</sup>	35 <sup>K</sup>	(35) <sup>S</sup>	(34) <sup>S</sup>	(37) <sup>S</sup>	(39) <sup>P</sup>	38 <sup>K</sup>	37 <sup>K</sup>	34 <sup>K</sup>	30 <sup>K</sup>	24 <sup>K</sup>					
6							23 <sup>K</sup>	28 <sup>K</sup>	(31) <sup>A</sup>	34 <sup>K</sup>	38 <sup>K</sup>	38 <sup>K</sup>	39 <sup>K</sup>	39 <sup>K</sup>	38 <sup>K</sup>	37 <sup>K</sup>	34 <sup>K</sup>	(31) <sup>A</sup>	(25) <sup>S</sup>					
7							(22) <sup>A</sup>	29 <sup>K</sup>	33 <sup>K</sup>	35 <sup>K</sup>	37 <sup>K</sup>	[38] <sup>M</sup>	(39) <sup>S</sup>	(39) <sup>S</sup>	(40) <sup>S</sup>	(37) <sup>S</sup>	[34] <sup>S</sup>	31 <sup>M</sup>	25 <sup>M</sup>					
8							A	28 <sup>K</sup>	35 <sup>K</sup>	35 <sup>K</sup>	39 <sup>K</sup>	38 <sup>K</sup>	39 <sup>K</sup>	A	39 <sup>K</sup>	[37] <sup>B</sup>	35 <sup>K</sup>	31 <sup>K</sup>	25 <sup>M</sup>					
9							19 <sup>K</sup>	24 <sup>K</sup>	29 <sup>K</sup>	31 <sup>K</sup>	34 <sup>K</sup>	35 <sup>K</sup>	39 <sup>M</sup>	39 <sup>K</sup>	37 <sup>K</sup>	37 <sup>K</sup>	33 <sup>K</sup>	(29) <sup>K</sup>	22 <sup>K</sup>					
10							17 <sup>K</sup>	22 <sup>K</sup>	29 <sup>K</sup>	32 <sup>K</sup>	(35) <sup>P</sup>	[36] <sup>K</sup>	38 <sup>K</sup>	39 <sup>K</sup>	37 <sup>K</sup>	37 <sup>K</sup>	37 <sup>K</sup>	32 <sup>K</sup>	(24) <sup>A</sup>					
11							A	27 <sup>K</sup>	31 <sup>K</sup>	34 <sup>K</sup>	[36] <sup>K</sup>	39 <sup>K</sup>	39 <sup>K</sup>	38 <sup>K</sup>	38 <sup>K</sup>	37 <sup>K</sup>	33 <sup>K</sup>	30 <sup>K</sup>	23 <sup>K</sup>					
12							23 <sup>K</sup>	29 <sup>K</sup>	32 <sup>K</sup>	34 <sup>K</sup>	35 <sup>K</sup>	35 <sup>K</sup>	(37) <sup>S</sup>	37 <sup>K</sup>	37 <sup>K</sup>	35 <sup>K</sup>	33 <sup>K</sup>	29 <sup>K</sup>	23 <sup>M</sup>	F <sup>K</sup>				
13							25 <sup>K</sup>	(27) <sup>A</sup>	(31) <sup>A</sup>	A	A	36 <sup>K</sup>	A	A	A	(34) <sup>P</sup>	34 <sup>K</sup>	29 <sup>M</sup>	25 <sup>K</sup>	18 <sup>K</sup>				
14							24 <sup>M</sup>	29 <sup>K</sup>	(32) <sup>K</sup>	(35) <sup>K</sup>	36 <sup>K</sup>	39 <sup>K</sup>	39 <sup>M</sup>	(38) <sup>K</sup>	(35) <sup>A</sup>	A <sup>K</sup>	A <sup>K</sup>	29 <sup>K</sup>	23 <sup>K</sup>					
15							21 <sup>K</sup>	28 <sup>M</sup>	31 <sup>K</sup>	33 <sup>K</sup>	35 <sup>K</sup>	(34) <sup>P</sup>	38 <sup>K</sup>	(39) <sup>P</sup>	(36) <sup>S</sup>	34 <sup>K</sup>	33 <sup>K</sup>	28 <sup>K</sup>	23 <sup>K</sup>					
16							23 <sup>M</sup>	30 <sup>K</sup>	32 <sup>K</sup>	35 <sup>K</sup>	36 <sup>K</sup>	(37) <sup>M</sup>	37 <sup>K</sup>	39 <sup>K</sup>	39 <sup>K</sup>	37 <sup>K</sup>	36 <sup>K</sup>	30 <sup>K</sup>	25 <sup>K</sup>					
17							25 <sup>K</sup>	31 <sup>K</sup>	32 <sup>K</sup>	34 <sup>K</sup>	35 <sup>K</sup>	37 <sup>K</sup>	39 <sup>K</sup>	(37) <sup>P</sup>	38 <sup>K</sup>	37 <sup>K</sup>	32 <sup>K</sup>	31 <sup>K</sup>	24 <sup>K</sup>					
18							23 <sup>K</sup>	30 <sup>K</sup>	32 <sup>K</sup>	33 <sup>K</sup>	(39) <sup>S</sup>	37 <sup>K</sup>	41 <sup>K</sup>	[40] <sup>B</sup>	39 <sup>K</sup>	[37] <sup>A</sup>	35 <sup>K</sup>	30 <sup>K</sup>	22 <sup>K</sup>					
19							(23) <sup>A</sup>	A	A	35 <sup>K</sup>	(37) <sup>S</sup>	[39] <sup>M</sup>	41 <sup>K</sup>	39 <sup>K</sup>	(37) <sup>S</sup>	37 <sup>K</sup>	34 <sup>K</sup>	31 <sup>K</sup>	25 <sup>K</sup>					
20							23 <sup>K</sup>	A	A	38 <sup>K</sup>	38 <sup>K</sup>	40 <sup>K</sup>	(40) <sup>S</sup>	40 <sup>K</sup>	39 <sup>K</sup>	38 <sup>M</sup>	34 <sup>K</sup>	31 <sup>K</sup>	23 <sup>K</sup>	19 <sup>K</sup>				
21							(24) <sup>A</sup>	30 <sup>K</sup>	(33) <sup>A</sup>	36 <sup>K</sup>	37 <sup>K</sup>	(40) <sup>S</sup>	(40) <sup>S</sup>	(38) <sup>S</sup>	40 <sup>K</sup>	35 <sup>K</sup>	A <sup>K</sup>	A <sup>K</sup>	25 <sup>K</sup>					
22							24 <sup>K</sup>	30 <sup>K</sup>	33 <sup>K</sup>	35 <sup>K</sup>	36 <sup>K</sup>	37 <sup>K</sup>	[39] <sup>A</sup>	40 <sup>K</sup>	39 <sup>K</sup>	40 <sup>K</sup>	(36) <sup>A</sup>	(30) <sup>S</sup>	25 <sup>K</sup>					
23							19 <sup>K</sup>	(24) <sup>K</sup>	30 <sup>K</sup>	33 <sup>K</sup>	35 <sup>K</sup>	35 <sup>K</sup>	39 <sup>K</sup>	A <sup>K</sup>	A <sup>K</sup>	A <sup>K</sup>	39 <sup>K</sup>	35 <sup>K</sup>	31 <sup>K</sup>	(25) <sup>K</sup>				
24							C	C	C	32 <sup>K</sup>	[35] <sup>A</sup>	38 <sup>K</sup>	36 <sup>K</sup>	(36) <sup>P</sup>	39 <sup>K</sup>	37 <sup>K</sup>	35 <sup>K</sup>	A <sup>K</sup>	A <sup>K</sup>					
25							25 <sup>K</sup>	29 <sup>K</sup>	[33] <sup>A</sup>	37 <sup>K</sup>	37 <sup>K</sup>	40 <sup>K</sup>	(40) <sup>P</sup>	(39) <sup>P</sup>	(37) <sup>S</sup>	37 <sup>K</sup>	35 <sup>K</sup>	31 <sup>K</sup>	25 <sup>K</sup>					
26							24 <sup>K</sup>	31 <sup>K</sup>	33 <sup>K</sup>	36 <sup>K</sup>	[36] <sup>A</sup>	37 <sup>K</sup>	A	A	A	38 <sup>K</sup>	(37) <sup>A</sup>	32 <sup>K</sup>	27 <sup>K</sup>					
27							25 <sup>K</sup>	31 <sup>K</sup>	32 <sup>K</sup>	36 <sup>K</sup>	37 <sup>K</sup>	37 <sup>K</sup>	39 <sup>K</sup>	39 <sup>M</sup>	[38] <sup>A</sup>	A <sup>K</sup>	35 <sup>K</sup>	31 <sup>K</sup>	25 <sup>K</sup>					
28							24 <sup>K</sup>	30 <sup>K</sup>	32 <sup>K</sup>	[34] <sup>K</sup>	37 <sup>K</sup>	39 <sup>K</sup>	39 <sup>K</sup>	39 <sup>K</sup>	38 <sup>K</sup>	37 <sup>K</sup>	34 <sup>K</sup>	31 <sup>K</sup>	25 <sup>K</sup>					
29							(25) <sup>A</sup>	30 <sup>K</sup>	33 <sup>K</sup>	35 <sup>K</sup>	36 <sup>K</sup>	37 <sup>K</sup>	(38) <sup>A</sup>	(39) <sup>S</sup>	38 <sup>K</sup>	37 <sup>K</sup>	34 <sup>K</sup>	31 <sup>K</sup>	26 <sup>K</sup>	20 <sup>K</sup>				
30							24 <sup>K</sup>	[28] <sup>K</sup>	34 <sup>K</sup>	(34) <sup>K</sup>	[34] <sup>K</sup>	38 <sup>K</sup>	39 <sup>K</sup>	(35) <sup>A</sup>	[35] <sup>B</sup>	(34) <sup>K</sup>	34 <sup>K</sup>	32 <sup>K</sup>	27 <sup>K</sup>	20 <sup>K</sup>				
31							(24) <sup>K</sup>	28 <sup>K</sup>	31 <sup>K</sup>	32 <sup>K</sup>	35 <sup>K</sup>	[37] <sup>A</sup>	39 <sup>K</sup>	37 <sup>K</sup>	(37) <sup>K</sup>	(36) <sup>K</sup>	35 <sup>K</sup>	31 <sup>K</sup>	[24] <sup>K</sup>	20 <sup>K</sup>				
Median							24	29	32	35	36	38	39	38	38	37	34	31	25					
Count							4	4	30	30	30	30	27	26	28	30	29	29	29	5				

Sweep 10 Mc to 250 Mc in 0.25 min  
Manual ☐ Automatic ☒



# TABLE 37

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

## IONOSPHERIC DATA

Es (Characteristics) Mc.Km (Unit) May 1949  
Observed at Washington, D. C.

Scated by: E. J. W., J. J. S., J. M. C.  
Calculated by: E. J. W., J. J. S., L. A. L.

Calculated by: E.J.W., J.J.S., L.A.L.																								
75°W																								
Mean Time																								
39.0°N, Long 77.5°W																								
Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	G	G	37 110	G	G	G	G	G	G	38 120	G	G	G	G	G	G	G
2	G	G	G	22 130	G	22 140	G	G	G	37 120	40 110	G	G	G	G	G	G	G	37 120	27 130	17 130	G	G	G
3	G	G	G	G	G	G	G	G	38 130	40 100	G	40 120	116 100	70 120	G	G	63 130	G	G	G	G	G	G	G
4	G	G	G	G	G	G	G	G	34 120	38 130	35 120	G	G	72 120	64 120	63 120	51 120	63 120	34 120	77 110	56 110	40 110	22 130	G
5	G	G	G	G	G	G	G	38 120	G	G	G	G	G	G	G	G	41 120	G	G	G	G	G	G	G
6	G	G	40 100	27 130	G	G	G	58 110	43 120	G	G	G	G	G	G	G	G	31 100	44 130	44 130	44 130	31 110	43 100	G
7	42 100	43 100	23 100	32 100	G	G	35 120	G	G	42 120	G	58 110	G	G	G	G	G	33 110	31 130	26 120	38 100	36 100	25 120	G
8	G	G	G	23 120	24 120	19 120	32 110	G	G	38 120	G	B	G	41 110	G	B	G	G	42 120	19 120	G	G	G	G
9	G	G	G	45 100	G	27 140	54 100	G	G	G	G	G	G	G	G	G	G	G	42 130	50 120	49 120	42 120	43 110	G
10	46 100	47 100	35 130	G	G	G	G	G	G	68 120	C	41 130	G	41 130	58 110	41 120	42 120	G	43 130	35 120	40 120	36 120	G	G
11	G	G	24 120	31 100	33 130	G	93 100	G	35 120	40 100	39 120	G	G	37 110	G	G	G	G	42 120	43 110	68 100	G	G	G
12	G	G	G	16 110	G	17 130	G	28 120	G	G	G	G	G	36 120	G	G	G	42 130	43 160	G	G	G	G	G
13	18 140	G	G	G	G	G	37 130	38 100	40 130	54 110	39 110	38 110	40 110	42 110	41 110	36 120	G	G	38 130	G	G	G	G	G
14	G	G	G	G	21 150	17 130	31 140	29 110	31 100	41 130	41 130	G	46 130	42 130	38 110	42 100	37 120	79 130	49 130	49 130	23 130	G	G	G
15	G	G	G	G	G	G	24 130	44 100	G	37 110	G	G	46 130	50 130	34 120	66 130	G	55 120	44 120	47 120	49 120	55 120	31 150	G
16	G	G	G	G	G	G	G	G	31 100	31 100	40 100	26 110	43 120	44 130	42 120	46 120	42 120	53 120	40 110	17 120	G	G	G	G
17	G	G	G	30 110	28 120	18 120	27 120	G	G	43 120	40 120	43 130	43 130	50 130	G	G	G	31 110	36 130	39 120	19 100	32 100	37 120	G
18	G	G	G	G	G	G	37 130	47 120	37 120	45 110	45 120	G	G	G	G	G	G	37 130	37 130	35 120	32 100	G	G	G
19	G	G	G	G	G	G	40 100	36 120	41 120	G	G	36 120	43 130	39 120	G	G	35 130	36 130	42 120	43 110	17 120	G	G	G
20	G	G	G	G	G	G	42 100	43 120	44 110	42 110	G	G	G	G	43 100	36 100	48 130	45 130	35 120	G	G	19 100	35 100	25 110
21	G	G	G	14 130	35 120	24 120	43 120	53 120	56 120	57 120	G	G	G	60 120	G	39 120	52 110	56 120	78 130	47 120	53 110	37 110	G	G
22	G	G	G	G	G	G	17 130	G	69 120	70 120	46 120	44 120	41 110	G	G	G	42 130	56 120	60 110	49 110	165 100	26 110	46 100	64 100
23	38 100	32 100	36 100	43 00	G	G	61 120	58 120	65 110	58 110	42 110	44 110	39 100	55 100	46 100	39 100	39 130	47 130	67 110	38 130	52 120	44 110	90 110	40 100
24	40 100	46 100	48 100	C	C	C	C	C	C	68 110	70 110	57 110	55 120	39 110	43 130	41 130	47 130	41 110	36 120	41 110	47 110	116 100	56 100	39 100
25	38 110	40 120	24 110	28 130	24 120	49 120	50 130	43 120	51 110	38 120	40 110	G	40 100	G	G	G	G	36 110	57 130	43 120	G	38 110	G	G
26	G	G	G	22 130	G	35 130	40 130	42 130	56 130	52 110	60 110	37 100	56 110	46 110	42 110	42 110	36 110	43 110	43 110	36 110	42 100	35 110	25 110	G
27	G	G	G	G	31 100	18 120	40 130	37 120	41 120	48 130	G	G	G	58 100	G	G	G	46 140	38 140	33 120	G	G	G	G
28	G	G	G	G	G	G	43 100	66 110	47 120	39 120	40 120	46 120	41 130	45 120	59 130	41 130	35 130	38 120	G	G	G	G	G	G
29	G	G	G	30 130	30 120	38 120	58 110	72 110	36 120	50 110	50 110	39 120	40 120	G	41 130	G	35 130	35 120	G	G	G	74 110	88 110	63 110
30	68 100	58 100	53 100	42 110	34 120	30 130	34 100	44 120	88 120	39 110	41 100	G	36 110	G	G	39 110	35 120	G	G	G	G	G	G	G
31	G	G	48 120	27 110	G	17 120	33 130	36 120	34 110	48 100	47 110	40 100	35 100	G	G	G	G	49 130	36 120	G	G	G	G	G
Median	**	**	**	15	**	**	34	36	40	40	**	**	**	37	**	**	35	36	40	34	19	**	**	**
Count	31	31	31	30	30	30	30	30	30	31	30	30	31	31	31	30	31	31	31	31	31	31	31	31

\*\* MEDIAN IS LESS THAN MEDIAN 100, OR LESS THAN LOWER FREQUENCY LIMIT OF RECORDER.

Sweep 1.0 Mc to 30.0 Mc in 0.25 min  
Manual ☐ Automatic ☒

**TABLE 38**  
 Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

**IONOSPHERIC DATA**  
 National Bureau of Standards  
 (Institution)  
 Scaled by: E.J.W., J.J.S., J.M.C.  
 Calculated by: E.J.W., J.J.S., L.A.L.

(M1500)F2 (Unit) May 1949  
 Observed at Washington, D. C.

Calculated by: E.J.W., J.J.S., L.A.L.																								
75°W																								
Mean Time																								
Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	(1.2) <sup>F</sup>	1.8	1.9	1.8	1.8	2.0	2.2	2.1	1.9	(2.0) <sup>P</sup>	1.9	1.8	1.8	1.7	1.7	1.7	1.9	(1.9) <sup>S</sup>	1.9	2.0	1.9	1.8	1.9	(1.7) <sup>S</sup>
2	(1.7) <sup>P</sup>	(1.9) <sup>P</sup>	1.8	1.7	1.8	1.7	1.9	1.8	1.7	1.7	1.7	1.7	(1.7) <sup>S</sup>	1.6	1.8	1.7	1.7	1.7	1.8	1.7	1.7	1.7	1.7	1.7
3	1.7	1.7	1.8	1.8	1.9	(2.0) <sup>S</sup>	2.0	2.0	2.0	1.8	1.6	1.6	1.7	A	1.7	1.6	1.6	1.7	1.6	1.6	(1.7) <sup>P</sup>	S	(2.0) <sup>S</sup>	1.7
4	1.7	1.6	1.5	1.5	1.6	(1.8) <sup>S</sup>	2.1	1.9	G	1.5	1.5	1.6	1.6	B	1.7	1.8	1.8	1.8	A	1.8	1.8	1.8	1.8	1.7
5	1.7	1.8	1.8	1.8	1.8	2.0	(2.2) <sup>S</sup>	2.0	1.9	1.9	1.8	1.7	1.7	1.7	1.7	1.7	1.6	(1.7) <sup>S</sup>	(1.9) <sup>S</sup>	1.8	(1.7) <sup>S</sup>	1.8	(1.6) <sup>S</sup>	
6	1.6	1.7	1.7	1.8	1.8	1.9	1.9	1.8	1.7	(1.7) <sup>S</sup>	(1.8) <sup>S</sup>	1.8	1.7	1.8	1.7	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.7
7	1.7	1.7	1.7	1.8	1.9	1.9	2.0	2.0	1.9	1.9	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.8	(1.7) <sup>S</sup>	
8	1.8	1.7	1.7	1.7	1.8	2.0	2.1	2.1	1.9	1.8	1.8	1.8	1.7	1.8	1.8	1.8	1.8	1.7	1.8	1.8	1.8	1.7	1.7	
9	1.6	1.6	1.6	1.6	1.7	1.7	(1.9) <sup>S</sup>	1.9	1.7	1.9	1.6	1.8	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7
10	(1.7) <sup>F</sup>	1.8	1.8	1.8	1.8	1.9	2.0	2.0	1.9	1.9	C	1.8	1.8	1.8	1.8	1.8	1.9	1.8	(1.9) <sup>S</sup>	1.9	1.9	1.8	(1.7) <sup>S</sup>	
11	1.8	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.9	1.8	(1.9) <sup>S</sup>	1.9	1.8	1.7	(1.7) <sup>S</sup>	
12	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	G	G	G	G	G	G	G	G	1.5	G	2.2	2.1	2.2	2.0	2.0	2.0
13	1.5	1.6	1.7	1.7	1.7	1.8	1.9	1.9	2.1	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9	1.8	1.7	1.7	
14	1.7	1.7	1.8	1.8	1.8	1.9	2.0	2.0	1.8	1.7	1.7	1.7	1.6	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.7	1.7
15	1.7	1.8	1.8	1.8	1.8	1.9	2.1	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	(2.0) <sup>S</sup>	1.8	1.7	1.7
16	1.8	1.6	1.6	1.7	1.7	1.9	2.1	2.0	(2.0) <sup>S</sup>	1.8	1.7	1.7	1.8	1.7	1.7	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8
17	1.9	1.9	1.8	1.8	1.7	1.7	2.0	1.9	1.9	S	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	
18	1.8	1.8	1.8	1.8	1.8	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.8	(1.9) <sup>S</sup>	(2.0) <sup>S</sup>	1.9	1.8	1.8	
19	(1.8) <sup>S</sup>	1.8	1.9	1.9	1.9	2.0	2.1	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0	1.9	1.8	1.9	1.7
20	1.7	1.7	1.7	1.7	1.8	2.0	2.0	2.0	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	
21	1.8	1.8	1.7	1.8	1.8	1.8	2.2	1.8	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9	1.9	2.0	1.9	1.8	1.7	
22	1.7	1.7	1.7	1.8	1.7	1.9	2.2	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.7	1.8	1.8	1.9	1.9	1.9	(1.8) <sup>S</sup>	1.8	
23	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.7	1.6	1.6	1.6	1.7	1.7	1.7	1.8	1.7	1.8	1.8	1.7	1.7	1.8	
24	1.8	1.8	1.7	C	C	C	C	C	C	1.8	1.9	1.9	1.9	1.8	1.8	1.9	1.8	1.9	1.9	1.9	1.9	A	1.8	1.8
25	1.8	1.8	1.8	1.8	1.8	2.0	1.8	1.9	(1.9) <sup>S</sup>	1.7	1.8	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	(1.8) <sup>S</sup>	1.8	1.8
26	1.8	1.8	1.7	1.7	(1.8) <sup>S</sup>	1.9	2.0	1.9	1.9	1.8	(1.9) <sup>S</sup>	1.8	1.8	1.7	1.8	1.8	1.8	1.8	2.0	1.9	1.9	1.8	1.8	
27	1.8	1.7	1.8	1.8	(1.7) <sup>S</sup>	(1.8) <sup>S</sup>	2.2	2.0	2.1	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	2.0	2.0	1.8	1.7	(1.8) <sup>S</sup>	
28	1.8	1.9	1.9	1.9	1.9	1.9	2.0	2.1	1.9	1.9	1.7	1.7	1.7	1.6	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	
29	1.8	1.8	1.8	1.8	1.8	1.9	2.1	2.0	2.0	1.7	1.8	1.8	1.8	1.8	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	
30	1.8	1.8	1.8	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.8	(2.1) <sup>S</sup>	1.8	1.8	1.7	1.7	1.6	1.7	1.8	1.8	(1.7) <sup>S</sup>	1.9	1.6	
31	1.6	1.6	1.6	1.6	1.6	1.9	1.9	1.8	1.7	1.6	G	1.5	1.7	1.6	1.8	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.6	
Median	1.8	1.8	1.8	1.8	1.8	1.9	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.7	
Count	31	31	31	30	30	30	30	30	30	30	30	31	30	29	31	31	31	31	30	30	31	29	31	31

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒



**TABLE 39**  
Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

**IONOSPHERIC DATA**

(M3000)F2

(Characteristic)

May 1949

(Unit)

Washington, D. C.

Observed at

Lat 39°0'N, Long 77°5'W

Mean Time

75°W

National Bureau of Standards  
(Institution)

Scaled by: E.J.W., J.J.S., J.M.C.

Calculated by: E.J.W., J.J.S., L.A.L.

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	(28) <sup>T</sup>	27	28	27	27	29	32	30	29	(30) <sup>P</sup>	29	28	27	26	27	26	27	(28) <sup>T</sup>	29	29	29	27	26	(26) <sup>T</sup>
2	(26) <sup>P</sup>	(27) <sup>P</sup>	28	27	26	27	28 <sup>K</sup>	28 <sup>K</sup>	26 <sup>K</sup>	26 <sup>K</sup>	25 <sup>K</sup>	G <sup>K</sup>	(26) <sup>K</sup>	25 <sup>K</sup>	26 <sup>K</sup>	25 <sup>K</sup>	26 <sup>K</sup>	26 <sup>K</sup>	27 <sup>K</sup>	28 <sup>K</sup>	26 <sup>K</sup>	25 <sup>K</sup>	26 <sup>K</sup>	26
3	26	26	26	28	27	29	(31) <sup>S</sup>	30	29	27	25	25	26	A	26	25	25	26	25	24	(25) <sup>S</sup>	5	(29) <sup>S</sup>	25
4	26 <sup>K</sup>	24 <sup>K</sup>	23 <sup>K</sup>	22 <sup>K</sup>	24 <sup>K</sup>	(27) <sup>K</sup>	31 <sup>K</sup>	28 <sup>K</sup>	G <sup>K</sup>	22 <sup>K</sup>	G <sup>K</sup>	25 <sup>K</sup>	B <sup>K</sup>	25 <sup>K</sup>	25 <sup>K</sup>	27 <sup>K</sup>	27 <sup>K</sup>	27 <sup>K</sup>	A <sup>K</sup>	A <sup>K</sup>	27 <sup>K</sup>	26 <sup>K</sup>	27	26
5	26	27 <sup>F</sup>	27 <sup>F</sup>	26 <sup>F</sup>	27 <sup>F</sup>	30 <sup>F</sup>	(33) <sup>S</sup>	30	28 <sup>F</sup>	28	27	26	26	25	25	26	25	(26) <sup>S</sup>	(28) <sup>S</sup>	(28) <sup>S</sup>	27	(26) <sup>S</sup>	25	(25) <sup>S</sup>
6	25	26	25	27	27	27	29	27	26	(26) <sup>S</sup>	(29) <sup>S</sup>	27	27	27	26	27	27	28	28	28	27	27	28	26
7	26	26	26	28	27	28	29	30	29	28	29	29	28	28	27	28	28	28	28	29	29	27	28	(27) <sup>S</sup>
8	27	25	26	26	27	30	31	30	28	27	27	27	26	27	27	27	27	27	27	28	28	25	26	
9	24	25	25 <sup>K</sup>	24 <sup>K</sup>	25 <sup>K</sup>	(28) <sup>S</sup>	29 <sup>K</sup>	(28) <sup>S</sup>	28 <sup>K</sup>	29 <sup>K</sup>	25 <sup>K</sup>	26 <sup>K</sup>	25 <sup>K</sup>	27 <sup>K</sup>	27 <sup>K</sup>	26 <sup>K</sup>	27 <sup>K</sup>	27 <sup>K</sup>	28 <sup>K</sup>	27 <sup>K</sup>	28 <sup>K</sup>	27 <sup>K</sup>	27	27 <sup>F</sup>
10	26 <sup>F</sup>	26 <sup>F</sup>	27 <sup>F</sup>	26 <sup>F</sup>	28 <sup>F</sup>	29 <sup>F</sup>	30	29 <sup>H</sup>	28	28 <sup>F</sup>	C	27	27	27	27	27	28	28	(29) <sup>S</sup>	29	28	27	26 <sup>F</sup>	(25) <sup>S</sup>
11	27	26	26	27 <sup>K</sup>	27 <sup>K</sup>	24 <sup>K</sup>	24 <sup>K</sup>	G <sup>K</sup>	25 <sup>K</sup>	24 <sup>K</sup>	26 <sup>K</sup>	26 <sup>K</sup>	28 <sup>K</sup>	25 <sup>K</sup>	26 <sup>K</sup>	28 <sup>K</sup>	30 <sup>K</sup>	32 <sup>K</sup>	32 <sup>K</sup>	33 <sup>K</sup>	(33) <sup>S</sup>	29 <sup>K</sup>	30 <sup>K</sup>	30 <sup>F</sup>
12	29 <sup>K</sup>	30 <sup>K</sup>	29 <sup>K</sup>	29 <sup>K</sup>	(25) <sup>K</sup>	23 <sup>K</sup>	25 <sup>K</sup>	G <sup>K</sup>	G <sup>K</sup>	G <sup>K</sup>	G <sup>K</sup>	G <sup>K</sup>	G <sup>K</sup>	G <sup>K</sup>	G <sup>K</sup>	22 <sup>K</sup>	24 <sup>K</sup>	G <sup>K</sup>	23 <sup>K</sup>	(26) <sup>S</sup>	24 <sup>K</sup>	26 <sup>K</sup>	25 <sup>K</sup>	23 <sup>K</sup>
13	23 <sup>K</sup>	24 <sup>K</sup>	26 <sup>K</sup>	27 <sup>K</sup>	26 <sup>K</sup>	28 <sup>K</sup>	28 <sup>K</sup>	29	30	30	28	29	27	29	28	27	29	29	28	29	28	28	25 <sup>K</sup>	23 <sup>K</sup>
14	27 <sup>F</sup>	27 <sup>F</sup>	27 <sup>K</sup>	30 <sup>K</sup>	26 <sup>K</sup>	29 <sup>K</sup>	30 <sup>K</sup>	29 <sup>K</sup>	28 <sup>K</sup>	25 <sup>K</sup>	27 <sup>K</sup>	26 <sup>K</sup>	24 <sup>K</sup>	27 <sup>K</sup>	26 <sup>K</sup>	28 <sup>K</sup>	27 <sup>K</sup>	27 <sup>K</sup>	28	28	28	29	27	26
15	26	27	27	28	27 <sup>F</sup>	29	31	27 <sup>F</sup>	27	27	29	28	28	27	27	28	28	28	28	29	29	28	27	27
16	27	25 <sup>F</sup>	25 <sup>F</sup>	25 <sup>F</sup>	28 <sup>F</sup>	29 <sup>F</sup>	30 <sup>F</sup>	30	(30) <sup>S</sup>	27	26	25	27	28	27	27	27	27	28	29	28	(27) <sup>P</sup>	27	(28) <sup>S</sup>
17	28 <sup>F</sup>	27	26 <sup>F</sup>	(26) <sup>S</sup>	26 <sup>F</sup>	29	30	28	27	5	29	26	27	27	27	27	28	29	29	29	28	28	27 <sup>F</sup>	29 <sup>F</sup>
18	27 <sup>F</sup>	26 <sup>F</sup>	27 <sup>F</sup>	28 <sup>F</sup>	28 <sup>F</sup>	29	31	30	30 <sup>F</sup>	28 <sup>F</sup>	28	28	28	28	28	27	28	28	(29) <sup>S</sup>	(30) <sup>S</sup>	29	28	27	28
19	(28) <sup>S</sup>	28	28	28	28	30	30	29 <sup>V</sup>	29	28	28	28	27	27	27	28	28	27	28	29	28	28	28	26
20	26	26	29	29	29	30	29	30	29	29	28	27	28	28	28	28	28	28	28	29	29	28	28	28
21	27	27	26	27	27	27	32	27 <sup>V</sup>	29	28	28	28	28	28	28	28	28	28	28	29	28	27	27	26
22	26	25	26	27	26	29	33	29 <sup>V</sup>	30	28	28	28	27	28	27	28	27	27	27	29	(28) <sup>S</sup>	29	(28) <sup>S</sup>	26
23	26	26 <sup>K</sup>	25 <sup>K</sup>	26 <sup>K</sup>	26 <sup>K</sup>	26 <sup>K</sup>	26 <sup>K</sup>	27 <sup>K</sup>	27 <sup>K</sup>	25 <sup>K</sup>	25 <sup>K</sup>	24 <sup>K</sup>	25 <sup>K</sup>	26 <sup>K</sup>	25 <sup>K</sup>	26 <sup>K</sup>	26 <sup>K</sup>	26 <sup>K</sup>	27 <sup>K</sup>	28 <sup>K</sup>	26 <sup>K</sup>	26	27	28
24	27	27 <sup>F</sup>	26 <sup>F</sup>	C	C	C	C	C	C	28	28	28	27	27	27	28	27	28	29	29	28	A	28 <sup>F</sup>	27
25	27	27	27	27	28	30	27	29 <sup>H</sup>	(29) <sup>S</sup>	27	27	26	26	27	27	26	27	28	28	29	(28) <sup>S</sup>	28	27	27
26	27	27	27	27	(28) <sup>S</sup>	28	29	29	23 <sup>F</sup>	27	(30) <sup>S</sup>	30	27	27	28	28	28	28	29	30	29	31	28	27
27	27	26	28	28	(27) <sup>S</sup>	(28) <sup>S</sup>	33	30	26	28	28	28	28	28	28	27	28	29	29	29	30	27	26	(28) <sup>S</sup>
28	27	29	29	28	28	29	30 <sup>K</sup>	30 <sup>K</sup>	29 <sup>K</sup>	28 <sup>K</sup>	26 <sup>K</sup>	27 <sup>K</sup>	26 <sup>K</sup>	25 <sup>K</sup>	26 <sup>K</sup>	26 <sup>K</sup>	26 <sup>K</sup>	27 <sup>K</sup>	28 <sup>K</sup>	27 <sup>K</sup>	28 <sup>K</sup>	27 <sup>K</sup>	27 <sup>K</sup>	27 <sup>K</sup>
29	27	27	27	28 <sup>F</sup>	29 <sup>F</sup>	31 <sup>F</sup>	30	30	29	26	28	28	28	27	27	26	28	28	28	28	29	28	28	28
30	27	27	27	28	28	28	30	30	29	28	27	(29) <sup>S</sup>	27	27	26	26	24	25	28 <sup>K</sup>	25 <sup>K</sup>	(26) <sup>S</sup>	28 <sup>K</sup>	27 <sup>K</sup>	24 <sup>K</sup>
31	24 <sup>K</sup>	24 <sup>K</sup>	(26) <sup>S</sup>	25 <sup>K</sup>	25 <sup>K</sup>	28 <sup>K</sup>	28 <sup>K</sup>	27 <sup>K</sup>	26 <sup>K</sup>	24 <sup>K</sup>	G <sup>K</sup>	24 <sup>K</sup>	27 <sup>K</sup>	25 <sup>K</sup>	27 <sup>K</sup>	26 <sup>K</sup>	27 <sup>K</sup>	27 <sup>K</sup>	27 <sup>K</sup>	29 <sup>K</sup>	28 <sup>K</sup>	26 <sup>K</sup>	(28) <sup>K</sup>	25 <sup>K</sup>
Median	27	26	27	27	27	29	30	29	28	28	28	27	27	27	27	27	27	28	28	29	28	27	27	26
Count	31	31	31	30	30	30	30	30	30	30	30	31	30	29	31	31	31	31	30	30	31	29	31	31

Sweep 10—Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

TABLE 40

IONOSPHERIC DATA

(M3000)F1 \_\_\_\_\_ May \_\_\_\_\_, 1949  
(Characteristics) (Unit) (Month)

Observed at Washington, D. C.

Lat 39.0°N, Long 77.5°W

National Bureau of Standards  
(Institution)

Scaled by: E.J.W., J.J.S., J.M.C.

Calculated by: E.J.W., J.J.S., J.M.C.

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								Q	Q	Q	L	Q	L	3.6	L	Q	L	Q						
2								Q <sup>K</sup>	3.4 <sup>K</sup>	3.3 <sup>K</sup>	3.5 <sup>K</sup>	3.7 <sup>K</sup>	3.5 <sup>K</sup>	3.4 <sup>K</sup>	3.4 <sup>K</sup>	3.3 <sup>K</sup>	3.5 <sup>K</sup>	3.3 <sup>K</sup>						
3								Q	L	3.4	3.4	3.4	3.4	A	A	L	A	Q	(3.2) <sup>P</sup>					
4								3.3 <sup>K</sup>	(3.3) <sup>K</sup>	3.7 <sup>K</sup>	3.4 <sup>K</sup>	(3.7) <sup>K</sup>	B <sup>K</sup>	B <sup>K</sup>	3.2 <sup>K</sup>	3.1 <sup>K</sup>	3.2 <sup>K</sup>	A <sup>K</sup>						
5								Q	Q	L	3.5	3.5	3.4	3.3	3.5	(3.2) <sup>P</sup>	L	L	Q					
6								L	3.2	3.4	3.5	3.5	(3.2) <sup>S</sup>	3.3	L	3.5	L	Q	Q					
7								Q	Q	Q	3.4	L	L	(3.6) <sup>S</sup>	L	3.4	Q	Q	Q					
8								Q	Q	3.3	3.5	B	3.3	B	3.5	L	3.2	Q	Q					
9								Q <sup>K</sup>	3.1 <sup>K</sup>	3.4 <sup>K</sup>	3.3 <sup>K</sup>	3.4 <sup>K</sup>	3.3 <sup>K</sup>	3.3 <sup>K</sup>	3.4 <sup>K</sup>	3.2 <sup>K</sup>	3.4 <sup>K</sup>	L <sup>K</sup>	Q <sup>K</sup>					
10								Q	L	L	C	3.2	L	L	L	L	L	L						
11							3.0 <sup>H</sup>	3.1 <sup>K</sup>	3.5 <sup>F</sup>	3.7 <sup>K</sup>	3.4 <sup>K</sup>	3.3 <sup>K</sup>	3.3 <sup>K</sup>	3.3 <sup>K</sup>	3.4 <sup>K</sup>	3.5 <sup>K</sup>	3.4 <sup>K</sup>	L <sup>K</sup>						
12							3.2 <sup>K</sup>	3.7 <sup>F</sup>	3.4 <sup>F</sup>	3.3 <sup>F</sup>	3.7 <sup>K</sup>	3.9 <sup>K</sup>	3.6 <sup>K</sup>	3.5 <sup>K</sup>	3.5 <sup>K</sup>	3.5 <sup>K</sup>	3.1 <sup>K</sup>	3.1 <sup>K</sup>	3.1 <sup>K</sup>					
13								L	L	L	L	3.6	3.6 <sup>H</sup>	3.5	L	L	3.5	L	L					
14								Q <sup>K</sup>	3.5 <sup>K</sup>	3.5 <sup>K</sup>	3.9 <sup>K</sup>	3.5 <sup>K</sup>	3.4 <sup>K</sup>	3.5 <sup>K</sup>	3.3 <sup>K</sup>	3.4 <sup>K</sup>	L <sup>K</sup>	L <sup>K</sup>						
15							Q	Q	L	3.6	3.6	3.4	3.2	3.2	A	A	L	A						
16								Q	Q	3.3	3.3	A	3.3	3.4	3.4	3.4	3.2	3.1	L					
17								3.4	3.3 <sup>H</sup>	3.4	3.5	3.1	3.9	3.2	3.3	3.4	3.6	L	Q					
18								Q	L	3.8	3.8	L	3.4	L	3.5	3.5	L	Q	L					
19								Q	L	L	L	(3.4) <sup>S</sup>	3.2	3.3	3.6 <sup>H</sup>	3.4	3.5	L	Q					
20								Q	4.0	Q	L	L	3.4	L	L	3.4	L	Q	Q					
21								Q	L	L	3.4	3.5	3.7	3.4	3.6	L	L	A						
22								M	M	L	3.3	3.4	3.3	3.5	3.3	L	L	A						
23								3.2 <sup>K</sup>	A <sup>K</sup>	3.7 <sup>K</sup>	3.8 <sup>K</sup>	3.8 <sup>K</sup>	3.5 <sup>K</sup>	3.4 <sup>K</sup>	3.5 <sup>K</sup>	3.6 <sup>K</sup>	3.4 <sup>K</sup>	3.4 <sup>K</sup>	A <sup>K</sup>					
24								C	C	A	L	3.5	3.5	3.3	L	L	L	Q						
25								L	3.3	3.4	3.4	3.5	3.6	3.4	3.4	L	3.2	L	Q					
26							Q	L	3.4	3.4	3.6	3.2	(3.7) <sup>S</sup>	3.5	3.4 <sup>H</sup>	3.8	3.5	L	L					
27								L	L	3.7	3.5	3.6 <sup>H</sup>	3.5	L	3.3	3.2	3.3	L	L					
28								Q <sup>K</sup>	(3.8) <sup>K</sup>	3.6 <sup>K</sup>	3.5 <sup>K</sup>	3.8 <sup>K</sup>	3.8 <sup>K</sup>	3.7 <sup>K</sup>	3.6 <sup>K</sup>	3.4 <sup>K</sup>	3.5 <sup>K</sup>	3.5 <sup>K</sup>	L <sup>K</sup>					
29								Q	Q	3.8	3.8	3.3	3.4	3.2	3.2	3.3	3.3	L	Q					
30							Q	L	L	L	3.7 <sup>H</sup>	3.8 <sup>H</sup>	3.7	3.7 <sup>H</sup>	B	3.3	L	L	Q <sup>K</sup>					
31								3.4 <sup>K</sup>	3.3 <sup>K</sup>	3.6 <sup>K</sup>	3.4 <sup>K</sup>	3.3 <sup>K</sup>	3.6 <sup>K</sup>	(3.9) <sup>K</sup>	3.5 <sup>K</sup>	3.3 <sup>K</sup>	3.3 <sup>K</sup>	3.2 <sup>K</sup>	Q <sup>K</sup>					
Median																								
Count								34	34	34	35	35	34	34	34	34	34	34	34					

Sweep 1.0 Mc to 3.0 Mc in 0.25 min

Manual ☐ Automatic ☒

Form adopted June 1946

National Bureau of Standards  
(Institution)  
Scoted by: E.J.W., J.J.S., J.M.C.  
Calculated by: E.J.W., J.J.S., J.M.C.

TABLE 41  
Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.  
IONOSPHERIC DATA

(M1500)E (Unit) May 1949  
(Characteristic) (Month)  
Observed at Washington, D. C.

Day	75°W										Mean Time									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
1							3.9 <sup>M</sup>	4.1 <sup>M</sup>	4.4 <sup>M</sup>	4.5 <sup>M</sup>	4.2 <sup>M</sup>	4.3 <sup>M</sup>	4.3 <sup>M</sup>	4.1 <sup>M</sup>	3.8 <sup>M</sup>	4.1 <sup>M</sup>	4.2 <sup>M</sup>	3.9 <sup>M</sup>	4.4 <sup>M</sup>	
2							4.5 <sup>M</sup>	4.1 <sup>M</sup>	4.4 <sup>M</sup>	4.2 <sup>M</sup>	4.3 <sup>M</sup>	4.3 <sup>M</sup>	4.1 <sup>M</sup>	4.3 <sup>M</sup>	4.1 <sup>M</sup>	4.3 <sup>M</sup>	4.5 <sup>M</sup>	4.1 <sup>M</sup>	4.3 <sup>M</sup>	
3							3.9 <sup>M</sup>	3.8 <sup>M</sup>	4.2 <sup>M</sup>	4.1 <sup>M</sup>	(4.2) <sup>S</sup>	4.3 <sup>M</sup>	4.3 <sup>M</sup>	(4.5) <sup>S</sup>	4.1 <sup>M</sup>	3.9 <sup>M</sup>	3.7 <sup>M</sup>	4.0 <sup>M</sup>	3.9 <sup>M</sup>	
4							3.7 <sup>M</sup>	3.9 <sup>M</sup>	4.2 <sup>M</sup>	4.4 <sup>M</sup>	(4.4) <sup>S</sup>	(4.1) <sup>S</sup>	4.3 <sup>M</sup>	4.3 <sup>M</sup>	4.2 <sup>M</sup>	4.3 <sup>M</sup>	4.3 <sup>M</sup>	4.1 <sup>M</sup>	4.3 <sup>M</sup>	
5							4.3 <sup>M</sup>	4.4 <sup>M</sup>	4.4 <sup>M</sup>	4.3 <sup>M</sup>	(4.3) <sup>S</sup>	(4.2) <sup>S</sup>	(4.2) <sup>S</sup>	(3.8) <sup>P</sup>	4.0 <sup>M</sup>	4.1 <sup>M</sup>	4.2 <sup>M</sup>	4.2 <sup>M</sup>	4.1 <sup>M</sup>	
6							4.4 <sup>M</sup>	4.3 <sup>M</sup>	(4.1) <sup>M</sup>	4.2 <sup>M</sup>	4.1 <sup>M</sup>	4.2 <sup>M</sup>	4.2 <sup>M</sup>	4.4 <sup>M</sup>	4.2 <sup>M</sup>	3.9 <sup>M</sup>	4.0 <sup>M</sup>	(4.2) <sup>S</sup>	(4.3) <sup>S</sup>	
7							(4.4) <sup>M</sup>	4.1 <sup>M</sup>	4.2 <sup>M</sup>	4.4 <sup>M</sup>	4.5 <sup>M</sup>	A	(4.3) <sup>S</sup>	(4.1) <sup>M</sup>	(4.3) <sup>S</sup>	A	S	3.8 <sup>M</sup>	4.0 <sup>M</sup>	
8							A	4.3 <sup>M</sup>	4.3 <sup>M</sup>	4.3 <sup>M</sup>	4.3 <sup>M</sup>	4.3 <sup>M</sup>	4.1 <sup>M</sup>	A	4.0 <sup>M</sup>	B	4.3 <sup>M</sup>	3.9 <sup>M</sup>	4.0 <sup>M</sup>	
9							4.2 <sup>M</sup>	4.2 <sup>M</sup>	4.1 <sup>M</sup>	4.4 <sup>M</sup>	4.3 <sup>M</sup>	4.2 <sup>M</sup>	4.1 <sup>M</sup>	4.0 <sup>M</sup>	4.1 <sup>M</sup>	4.1 <sup>M</sup>	4.2 <sup>M</sup>	(4.1) <sup>S</sup>	4.2 <sup>M</sup>	
10							4.6 <sup>M</sup>	4.1 <sup>M</sup>	4.3 <sup>M</sup>	(4.0) <sup>P</sup>	C	4.2 <sup>M</sup>	4.4 <sup>M</sup>	4.2 <sup>M</sup>	4.1 <sup>M</sup>	4.1 <sup>M</sup>	(4.3) <sup>S</sup>	4.1 <sup>M</sup>	(4.2) <sup>M</sup>	
11							A	4.1 <sup>M</sup>	4.1 <sup>M</sup>	4.4 <sup>M</sup>	A	4.2 <sup>M</sup>	4.3 <sup>M</sup>	4.2 <sup>M</sup>	4.2 <sup>M</sup>	4.3 <sup>M</sup>	4.2 <sup>M</sup>	4.0 <sup>M</sup>	3.9 <sup>M</sup>	
12							4.0 <sup>M</sup>	4.2 <sup>M</sup>	4.0 <sup>M</sup>	4.1 <sup>M</sup>	4.3 <sup>M</sup>	4.3 <sup>M</sup>	(4.3) <sup>S</sup>	4.1 <sup>M</sup>	4.1 <sup>M</sup>	4.3 <sup>M</sup>	4.2 <sup>M</sup>	4.2 <sup>M</sup>	3.9 <sup>M</sup>	
13							4.1 <sup>M</sup>	4.3 <sup>M</sup>	(4.5) <sup>M</sup>	A	A	4.2 <sup>M</sup>	A	A	A	(4.4) <sup>P</sup>	4.1 <sup>M</sup>	4.1 <sup>M</sup>	4.0 <sup>M</sup>	
14							4.2 <sup>M</sup>	4.1 <sup>M</sup>	(4.6) <sup>M</sup>	(4.3) <sup>M</sup>	4.2 <sup>M</sup>	4.0 <sup>M</sup>	4.3 <sup>M</sup>	(4.5) <sup>M</sup>	(4.0) <sup>M</sup>	A	A	4.1 <sup>M</sup>	4.2 <sup>M</sup>	
15							4.2 <sup>M</sup>	4.2 <sup>M</sup>	4.1 <sup>M</sup>	4.2 <sup>M</sup>	4.3 <sup>M</sup>	(4.2) <sup>S</sup>	4.1 <sup>M</sup>	(4.2) <sup>S</sup>	3.9 <sup>M</sup>	4.1 <sup>M</sup>	4.2 <sup>M</sup>	4.3 <sup>M</sup>	4.4 <sup>M</sup>	
16							3.9 <sup>M</sup>	3.7 <sup>M</sup>	4.1 <sup>M</sup>	4.0 <sup>M</sup>	4.2 <sup>M</sup>	(4.2) <sup>M</sup>	4.1 <sup>M</sup>	4.1 <sup>M</sup>	3.8 <sup>M</sup>	4.0 <sup>M</sup>	4.2 <sup>M</sup>	4.0 <sup>M</sup>	4.3 <sup>M</sup>	
17							3.7 <sup>M</sup>	3.9 <sup>M</sup>	4.4 <sup>M</sup>	4.2 <sup>M</sup>	4.5 <sup>M</sup>	4.3 <sup>M</sup>	4.1 <sup>M</sup>	(4.0) <sup>P</sup>	4.0 <sup>M</sup>	3.8 <sup>M</sup>	3.9 <sup>M</sup>	4.3 <sup>M</sup>		
18							4.3 <sup>M</sup>	4.0 <sup>M</sup>	4.4 <sup>M</sup>	4.5 <sup>M</sup>	(4.3) <sup>S</sup>	4.2 <sup>M</sup>	4.1 <sup>M</sup>	B	4.1 <sup>M</sup>	A	4.3 <sup>M</sup>	4.0 <sup>M</sup>	4.5 <sup>M</sup>	
19							(4.0) <sup>M</sup>	A	A	4.0 <sup>M</sup>	(4.1) <sup>M</sup>	A	3.9 <sup>M</sup>	4.2 <sup>M</sup>	(4.3) <sup>S</sup>	4.1 <sup>M</sup>	4.0 <sup>M</sup>	3.9 <sup>M</sup>	4.3 <sup>M</sup>	
20							4.4 <sup>M</sup>	A	A	4.5 <sup>M</sup>	4.2 <sup>M</sup>	4.3 <sup>M</sup>	(4.3) <sup>S</sup>	4.0 <sup>M</sup>	4.1 <sup>M</sup>	4.1 <sup>M</sup>	4.1 <sup>M</sup>	3.9 <sup>M</sup>	4.3 <sup>M</sup>	4.6 <sup>M</sup>
21							(4.3) <sup>M</sup>	4.1 <sup>M</sup>	(4.2) <sup>M</sup>	4.3 <sup>M</sup>	4.4 <sup>M</sup>	(4.3) <sup>S</sup>	(4.3) <sup>S</sup>	(4.3) <sup>S</sup>	4.2 <sup>M</sup>	4.3 <sup>M</sup>	A	A	4.3 <sup>M</sup>	
22							4.3 <sup>M</sup>	4.3 <sup>M</sup>	4.2 <sup>M</sup>	4.3 <sup>M</sup>	4.4 <sup>M</sup>	4.4 <sup>M</sup>	A	4.0 <sup>M</sup>	4.1 <sup>M</sup>	4.2 <sup>M</sup>	(4.2) <sup>M</sup>	(4.1) <sup>S</sup>	4.2 <sup>M</sup>	
23							4.4 <sup>M</sup>	(4.2) <sup>M</sup>	4.0 <sup>M</sup>	4.2 <sup>M</sup>	4.3 <sup>M</sup>	4.1 <sup>M</sup>	4.1 <sup>M</sup>	A	A	4.2 <sup>M</sup>	4.3 <sup>M</sup>	4.0 <sup>M</sup>	(4.4) <sup>M</sup>	
24							C	C	C	4.5 <sup>M</sup>	A	3.9 <sup>M</sup>	4.2 <sup>M</sup>	(4.2) <sup>P</sup>	3.9 <sup>M</sup>	4.1 <sup>M</sup>	4.0 <sup>M</sup>	A	A	
25							4.2 <sup>M</sup>	4.2 <sup>M</sup>	A	4.1 <sup>M</sup>	4.3 <sup>M</sup>	4.2 <sup>M</sup>	(4.2) <sup>P</sup>	(4.1) <sup>P</sup>	(4.2) <sup>S</sup>	4.1 <sup>M</sup>	4.0 <sup>M</sup>	4.1 <sup>M</sup>		
26							4.3 <sup>M</sup>	3.9 <sup>M</sup>	4.2 <sup>M</sup>	4.2 <sup>M</sup>	A	4.3 <sup>M</sup>	A	A	A	4.3 <sup>M</sup>	(3.8) <sup>M</sup>	4.1 <sup>M</sup>	4.4 <sup>M</sup>	
27							4.4 <sup>M</sup>	3.9 <sup>M</sup>	4.4 <sup>M</sup>	4.3 <sup>M</sup>	4.5 <sup>M</sup>	4.3 <sup>M</sup>	4.4 <sup>M</sup>	4.4 <sup>M</sup>	A	4.2 <sup>M</sup>	4.3 <sup>M</sup>	4.1 <sup>M</sup>	4.2 <sup>M</sup>	
28							4.3 <sup>M</sup>	4.1 <sup>M</sup>	4.4 <sup>M</sup>	A	4.2 <sup>M</sup>	4.1 <sup>M</sup>	4.1 <sup>M</sup>	4.1 <sup>M</sup>	4.0 <sup>M</sup>	4.1 <sup>M</sup>	4.1 <sup>M</sup>	3.9 <sup>M</sup>	4.0 <sup>M</sup>	
29							(4.2) <sup>M</sup>	4.1 <sup>M</sup>	4.2 <sup>M</sup>	4.3 <sup>M</sup>	4.2 <sup>M</sup>	4.2 <sup>M</sup>	(4.2) <sup>S</sup>	4.2 <sup>M</sup>	4.3 <sup>M</sup>	4.2 <sup>M</sup>	4.2 <sup>M</sup>	4.0 <sup>M</sup>	3.9 <sup>M</sup>	
30							4.2 <sup>M</sup>	A	4.1 <sup>M</sup>	(4.4) <sup>M</sup>	A	4.4 <sup>M</sup>	4.4 <sup>M</sup>	(4.4) <sup>M</sup>	B	(4.3) <sup>M</sup>	(4.4) <sup>M</sup>	3.8 <sup>M</sup>	4.0 <sup>M</sup>	
31							(4.4) <sup>M</sup>	4.3 <sup>M</sup>	4.2 <sup>M</sup>	4.3 <sup>M</sup>	4.3 <sup>M</sup>	A	4.1 <sup>M</sup>	4.3 <sup>M</sup>	(4.3) <sup>P</sup>	(4.2) <sup>M</sup>	3.9 <sup>M</sup>	3.9 <sup>M</sup>	4.0 <sup>M</sup>	
Median																				
Count																				

Sweep 1.0 Mc to 35.0 Mc in 0.025 min

Manual ☐ Automatic ☒

Table 42Ionospheric Storminess at Washington, D. C.May 1949

Day	Ionospheric character*		Principal storms		Geomagnetic character**	
	00-12 GCT	12-24 GCT	Beginning GCT	End GCT	00-12 GCT	12-24 GCT
1	1	2			0	1
2	2	5	1100	----	2	3
3	2	3	----	0400	2	2
4	4	4	0500	----	4	2
5	1	1	----	0300	1	3
6	2	2			3	2
7	2	3			2	2
8	1	3			2	2
9	4	5	0700	----	3	3
10	2	1	----	0300	2	3
11	2	4	0800	----	4	2
12	4	7	----	----	5	8
13	6	2	----	1200	5	2
14	3	4	0700	2300	3	3
15	2	1			3	2
16	2	1			3	3
17	3	2			2	2
18	1	1			1	2
19	0	1			1	2
20	1	3			1	1
21	1	3			2	2
22	2	2			2	2
23	3	4	0600	----	2	3
24	2	3	----	0200	2	1
25	1	2			1	2
26	1	1			1	2
27	1	3			1	2
28	1	4	1100	----	2	1
29	1	3	----	0500	1	1
30	2	3	2300	----	1	5
31	5	4	----	----	4	4

\*Ionosphere character figure (I-figure) for ionospheric storminess at Washington, D. C., during 12-hour period, on an arbitrary scale of 0 to 9, 9 representing the greatest disturbance.

\*\*Average for 12 hours of Cheltenham, Maryland, geomagnetic K-figures on an arbitrary scale of 0 to 9, 9 representing the greatest disturbance.

----Dashes indicate continuing storm.



Table 43

Sudden Ionosphere Disturbances Observed at Washington, D. C.,May 1949

1949 Day	GCT		Location of transmitters	Relative intensity at minimum*	Other phenomena
	Beginning	End			
May 5	1128	1240	Ohio, D.C., England	0.02	
7	1044	1055	England	0.03	
7	1308	1335	D.C., England	0.03	
7	2040	2105	Ohio, D.C., Canal Zone, England	0.1	Terr.mag.pulse** 2041-2050
8	1529	1900	Ohio, D.C., Canal Zone, England	0.0	Solar flare*** 1528
8	1955	2010	Ohio, D.C., England	0.03	Terr.mag.pulse** 1953-2000
9	1209	1240	Ohio, D.C., England	0.05	
10	2002	2200	Ohio, D.C., England	0.01	Terr.mag.pulse** 2003-2045 Solar flare*** 2002
18	1758	1835	Ohio, D.C., Canal Zone, England	0.0	Solar flare*** 1800
29	1236	1255	Ohio, D.C., England	0.1	
30	1841	1920	Ohio, D.C.	0.0	
30	2113	2125	Ohio, D.C.	0.01	
31	1858	1920	Ohio, D.C.	0.03	

\*Ratio of received field intensity during SID to average field intensity before and after, for station W8XAL, 6080 kilocycles, 600 kilometers distant, for all SID except the following: Station GLH, 13525 kilocycles, received in New York, 5340 kilometers distant, was used for the SID on May 7 at 1044 and at 1308.

\*\*As observed on Cheltenham magnetogram of the United States Coast and Geodetic Survey.

\*\*\*Time of observation at McMath-Hulbert Observatory, Michigan.



Table 44

Sudden Ionosphere Disturbances Reported by Engineer-in-Chief,  
Cable and Wireless, Ltd., as Observed in England

1949 Day	GCT		Receiving station	Location of transmitters	Other phenomena
	Beginning	End			
April 26	1310	1320	Somerton	Gold Coast, New York, Union of S. Africa	
May 5	1120	1300	Brentwood	Afghanistan, Austria, Bahrein I., Barbados, Belgian Congo, Bulgaria, Canary Is., Chile, Colombia, France, Greece, India, Iran, Kenya, Madagascar, Malta, Palestine, Portugal, Southern Rhodesia, Spain, Switzerland, Syria, Turkey, Uruguay, U.S.S.R., Yugoslavia, Zanzibar	
5	1124	1240	Somerton	Aden, Argentina, Australia, Barbados, Brazil, Canada, Ceylon, China, Egypt, Gold Coast, India, New York, Nigeria, Union of S. Africa	
7	1045	1100	Brentwood	Austria, Bahrein I., Barbados, Belgian Congo, Bulgaria, Canary Is., Chile, Greece, India, Iran, Kenya, Palestine, Portugal, Southern Rhodesia, Spain, Switzerland, Syria, Trans-Jordan, Turkey, U.S.S.R., Yugoslavia, Zanzibar	
7	1046	1100	Somerton	Aden, Argentina, Australia, Brazil, Ceylon, India, Nigeria, Union of S. Africa	
8	1543	1625	Somerton	New York	Solar flare* 1528
9	1208	1225	Brentwood	Austria, Bahrein I., Belgian Congo, Canary Is., Chile, Greece, India, Iran, Kenya, Malta, Palestine, Portugal, Southern Rhodesia, Spain, Switzerland, Syria, U.S.S.R., Yugoslavia, Zanzibar	

\*Time of observation at McMath-Hulbert Observatory, Michigan.

Table 45

Sudden Ionosphere Disturbances Reported by RCA Communications, Inc.,  
as Observed at Riverhead, New York

1949 Day	GCT		Location of transmitters	Other phenomena
	Beginning	End		
May 5	1129	1250	Argentina, Canada, England, Italy, Morocco	
8	1525	1645	Argentina, Canada, Cuba, England, Italy, Morocco, Panama	Solar flare* 1528
9	1210	1300	Argentina, Canada, England, Italy, Morocco, Panama	
10	2015	2055	Argentina, California, Canada, England, Italy, Morocco, Panama	Solar flare* 2002
30	1844	1900	Argentina, Brazil, Canada, Cuba, England, Italy, Morocco, Panama	

\*Time of observation at McMath-Hulbert Observatory, Michigan.

Table 46

Sudden Ionosphere Disturbances Reported by International Telephone  
and Telegraph Corporation, as Observed at Platenos, Argentina

1949 Day	GCT		Location of transmitters	Other phenomena
	Beginning	End		
February				
1	1224	1355	Brazil, Chile, Denmark, Germany, Italy, Netherlands, New York, Venezuela	
3	1350	1430	Bolivia, Brazil, Cuba, Denmark, England, Germany, Italy, New York, Peru, Switzerland, Venezuela	
7	1412	1455	Bolivia, Brazil, Colombia, Cuba, Denmark, England, Germany, New York, Peru, Venezuela	
12	1511	1540	Bolivia, Brazil, Chile, Cuba, Denmark, France, Germany, New York, Peru, Switzerland, Venezuela	
14	1554	1625	Bolivia, Brazil, Chile, Cuba, Denmark, France, Germany, Netherlands, New York, Peru, Venezuela	
17	1707	1730	Bolivia, Brazil, Chile, Cuba, Denmark, England, Germany, New York, Peru, Spain, Venezuela	
March				
26	1424	1515	Bolivia, Brazil, Cuba, Denmark, England, Germany, New York, Peru, Switzerland, Venezuela	Solar flare* 1424 Solar flare** 1427
31	1740	1805	Bolivia, Brazil, Chile, Cuba, Denmark, England, France, Germany, Netherlands, New York, Spain	
April				
5	1638	1700	Bolivia, Brazil, Chile, Cuba, Denmark, Germany, Netherlands, New York, Peru, Spain, Venezuela	

\*Time of observation at Prague Observatory, Czechoslovakia.

\*\*Time of observation at Meudon Observatory, France.

Table 47

Sudden Ionosphere Disturbances Reported by RCA Communications, Inc.,  
as Observed at Point Reyes, California

1949 Day	GCT		Location of transmitters	Other phenomena
	Beginning	End		
May				
7	2045	2105	Australia, China, Hawaii, Japan, Philippine Is.	
10	2008	2140	Australia, China, Hawaii, Japan, New York, Philippine Is.	Solar flare 2008

\*Time of observation at McMath-Hulbert Observatory, Michigan.

Note: Observers are invited to send to the CRPL information on times of beginning and end of sudden ionosphere disturbances for publication as above. Address letters to the Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

Table 48

**Provisional Radio Propagation Quality Figures**  
(Including Comparisons with CRPL Warnings and CRPL Probable Disturbed Period Forecasts)  
April 1949

Day	North Atlantic				North Pacific			
	Quality figure	CRPL* Warning	CRPL** Forecast of probable disturbed periods	Geo-magnetic K <sub>Ch</sub>	Quality figure	CRPL* Warning	CRPL** Forecast of probable disturbed periods	Geo-magnetic K <sub>Ch</sub>
	01-12 OCT 13-24 OCT	01-12 OCT 13-24 OCT		01-12 OCT 13-24 OCT	01-12 OCT 13-24 OCT	01-12 OCT 13-24 OCT		01-12 OCT 13-24 OCT
1	7 7			1 2	6 6			1 2
2	7 6			1 1	5 6			1 1
3	7 6			2 2	6 7			2 2
4	6 7			2 1	5 7			2 1
5	6 6		X	1 2	(4) 5		X	1 2
6	7 7		X	2 1	5 8		X	2 1
7	7 7			1 4	6 6			1 4
8	(2)(4)	X X		6 4	(4) 5	X X		6 4
9	5 6	X	X	2 2	(4) 6	X	X	2 2
10	5 5			4 4	5 (4)			4 4
11	(4) 6	X		4 4	(4) 6	X		4 4
12	5 5	X X		3 4	(4)(4)	X X		3 4
13	(3) 5	X X		4 3	(4)(4)	X X		4 3
14	(4) 5			4 2	5 6			4 2
15	5 6			3 2	6 6			3 2
16	5 6			3 3	5 6			3 3
17	6 7			3 2	5 6			3 2
18	5 5		X	2 1	5 5		X	2 1
19	5 6		X	2 1	6 7		X	2 1
20	7 7			1 1	6 6			1 1
21	7 7			2 2	6 7			2 2
22	6 6			1 1	6 7			1 1
23	6 6			1 1	6 7			1 1
24	7 6			2 2	6 7			2 2
25	7 6			2 1	6 7			2 1
26	7 6			2 2	5 6			2 2
27	5 6			3 1	5 6			3 1
28	7 6			2 2	5 6			2 2
29	6 6			1 2	5 5			1 2
30	6 7			1 1	5 5			1 1
Score:								
H		2	0			4	2	
M		2	4			3	5	
G		24	21			23	20	
(S)		2	3			0	2	
S		0	2			0	1	

**Quality Figure Scale:**

- 1 - Useless
- 2 - Very poor
- 3 - Poor
- 4 - Poor to fair
- 5 - Fair
- 6 - Fair to good
- 7 - Good
- 8 - Very good
- 9 - Excellent

**Symbols:**

- X Warning given or probable disturbed date
- H Quality 4 or worse on day or half day of warning
- M Quality 4 or worse on day or half day of no warning
- G Quality 5 or better on day of no warning
- (S) Quality 5 on day of warning
- S Quality 6 or better on day of warning
- ( ) Quality 4 or worse (disturbed)

Geomagnetic K<sub>Ch</sub> on the standard scale of 0 to 9, 9 representing the greatest disturbance.

\*Broadcast on WWV, Washington, D.C. Times of warnings recorded to nearest half day as broadcast.

\*\*In addition to dates marked X, the following were designated as probable disturbed days on forecasts more than eight days in advance of said dates: April 10 and 11.

Table 49American and Zürich Provisional Relative Sunspot NumbersMay 1949

Date	R <sub>A</sub> *	R <sub>Z</sub> **	Date	R <sub>A</sub> *	R <sub>Z</sub> **
1	156	77	17	153	111
2	160	74	18	136	111
3	164	121	19	142	110
4	181	122	20	138	105
5	207	139	21	152	100
6	200	140	22	151	111
7	161	132	23	166	119
8	164	118	24	189	140
9	141	114	25	152	120
10	127	100	26	146	103
11	108	106	27	146	114
12	109	62	28	149	98
13	85	60	29	167	119
14	85	56	30	168	120
15	90	69	31	165	95
16	112	80	Mean	147.4	104.7

\*Combination of reports from 49 observers; see page 8.

\*\*Dependent on observations at Zürich Observatory and its stations at Locarno and Arosa.

Table 50a

Coronal observations at Climax, Colorado (5303A), east limb

Date GCT	Degrees north of the solar equator																	0°	Degrees south of the solar equator																				
	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10		5	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90		
1949																																							
May 2.0	X	-	-	-	-	-	-	-	5	5	4	5	8	13	20	13	13	9	10	13	13	11	9	8	6	-	-	-	-	-	-	-	-	-	-	-	-	-	
2.7	-	-	-	-	-	-	4	6	6	8	8	10	11	12	15	15	14	12	12	14	15	13	12	11	8	7	5	5	-	-	-	-	-	-	-	-	-	-	
3.6	-	-	-	-	-	-	-	-	3	3	4	4	8	11	12	14	15	13	11	13	15	11	10	9	8	6	-	-	-	-	-	-	-	-	-	-	-	-	
4.6	-	-	-	-	-	4	4	4	5	6	6	8	14	18	20	27	20	10	9	12	18	11	10	10	11	11	10	9	4	-	-	-	-	-	-	-	-	-	
7.8	X	-	-	-	-	-	-	-	-	8	9	10	10	16	13	14	16	5	9	11	11	12	13	13	11	10	8	5	3	-	-	-	-	-	X	X	X		
9.7	X	-	-	-	-	-	-	3	4	6	9	12	13	16	13	12	10	8	9	10	11	15	16	15	13	12	7	-	-	-	-	-	X	X	X	X	X		
14.6	-	-	-	-	-	-	-	-	3	8	9	3	10	11	15	18	20	19	20	20	18	11	10	10	8	7	5	4	3	2	-	-	-	-	-	-	-	-	
15.7	X	X	X	X	-	-	-	-	-	-	-	-	5	8	10	11	11	11	13	14	12	10	8	7	5	-	-	-	-	-	-	-	-	-	X	X	X		
16.6	-	-	-	-	-	-	-	-	3	3	5	9	10	13	14	14	15	15	15	14	13	12	12	6	3	-	-	-	-	-	-	-	-	-	-	-	-	-	
19.6	-	-	-	-	-	-	-	-	4	6	7	5	6	8	12	13	13	10	9	9	9	9	9	10	9	3	-	-	-	-	-	-	-	-	-	-	-	-	
22.9	X	-	-	-	-	-	-	3	3	4	5	5	14	20	13	22	16	13	10	7	9	10	11	13	12	10	5	-	-	-	-	-	-	-	-	-	X	-	
23.7	X	-	-	-	-	-	2	3	3	3	2	10	14	13	13	12	12	11	10	9	9	9	10	11	11	5	2	-	-	-	-	-	-	-	-	-	-	-	
24.7	X	X	X	X	X	X	X	X	X	X	X	X	X	X	7	7	9	10	10	11	12	10	9	5	-	-	-	-	-	-	-	-	-	X	X	X	X		
25.6	-	-	-	-	-	-	-	-	-	3	4	11	13	13	14	15	13	9	5	7	8	8	8	9	9	3	-	-	-	-	-	-	-	-	-	-	-	-	
26.6	X	-	-	-	-	-	-	-	2	3	10	12	18	17	15	14	13	13	10	10	9	8	8	7	6	5	-	-	-	-	-	-	-	-	-	-	-	-	
30.6	-	-	-	-	-	-	-	-	-	-	-	4	7	10	10	9	7	5																					
31.6	X	-	-	-	-	-	-	-	-	-	-	3	4	7	8	8	5	4	4	8	11	12	12	7	3	-	-	-	-	-	-	-	-	-	-	-	-		

Table 51a

Coronal observations at Climax, Colorado (6374A), east limb

[illegible]

Table 52a

Coronal observations at Climax, Colorado (6704A), east limb

[illegible]





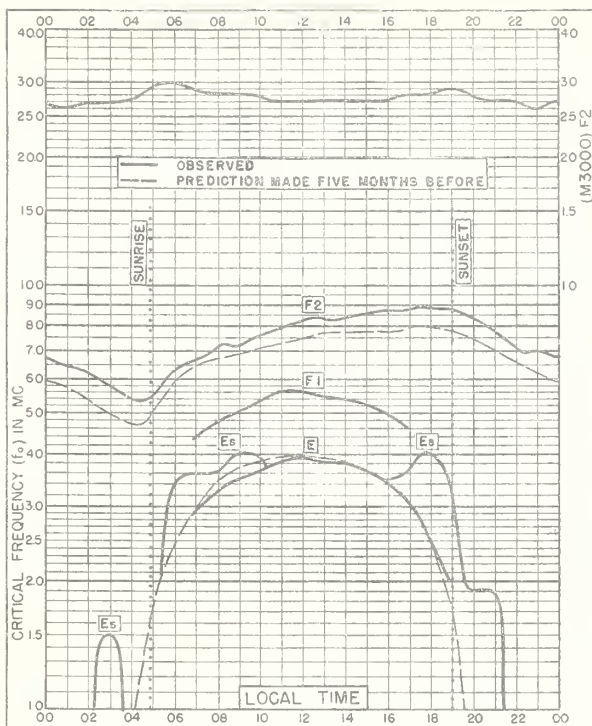


Fig. 1. WASHINGTON, D. C.  
39.0°N, 77.5°W

MAY 1949

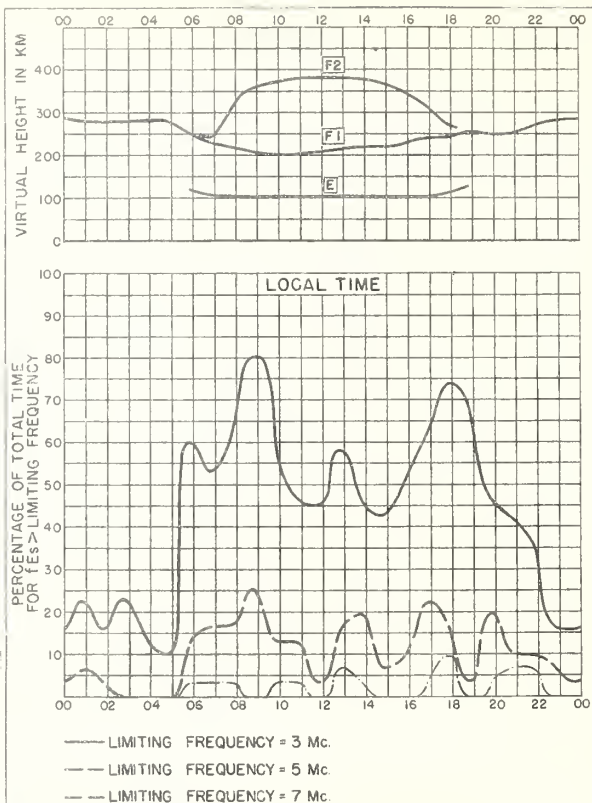


Fig. 2. WASHINGTON, D. C.

MAY 1949

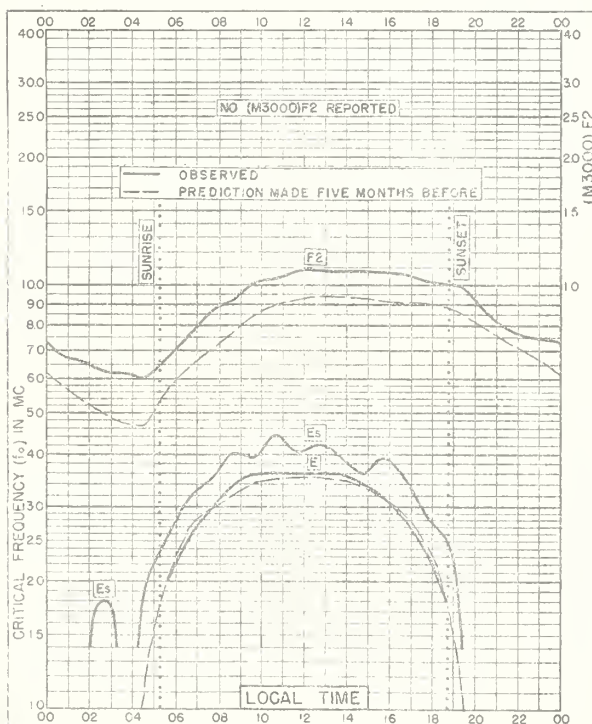


Fig. 3. LINDAU/HARZ, GERMANY  
51.6°N, 10.1°E

APRIL 1949

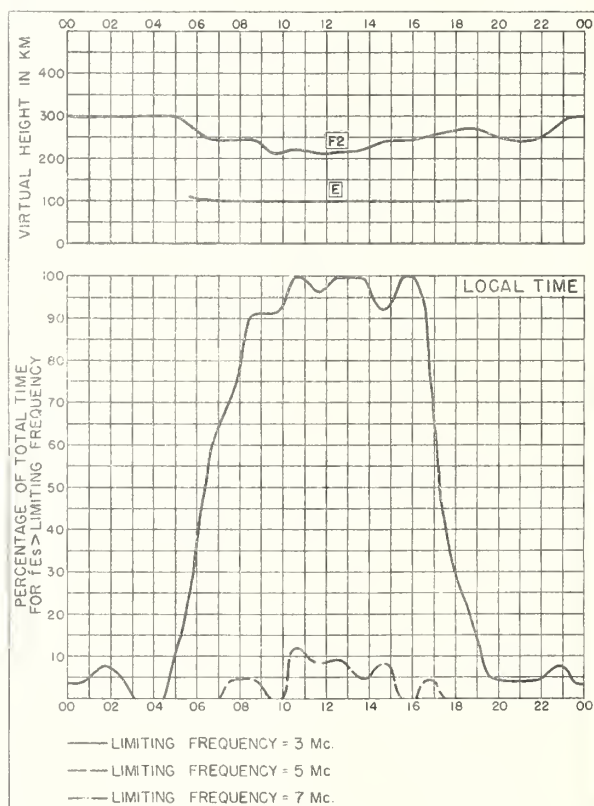


Fig. 4. LINDAU/HARZ, GERMANY

APRIL 1949

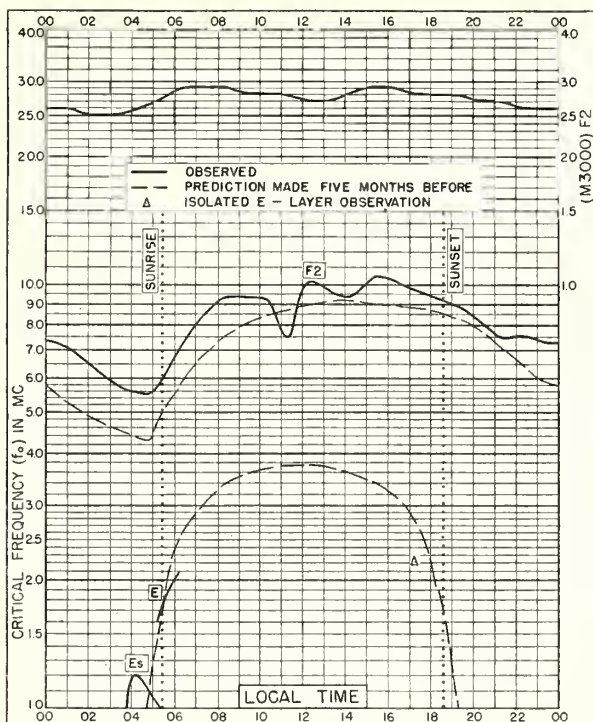


Fig. 5. BOSTON, MASSACHUSETTS  
42.4°N, 71.2°W

APRIL 1949

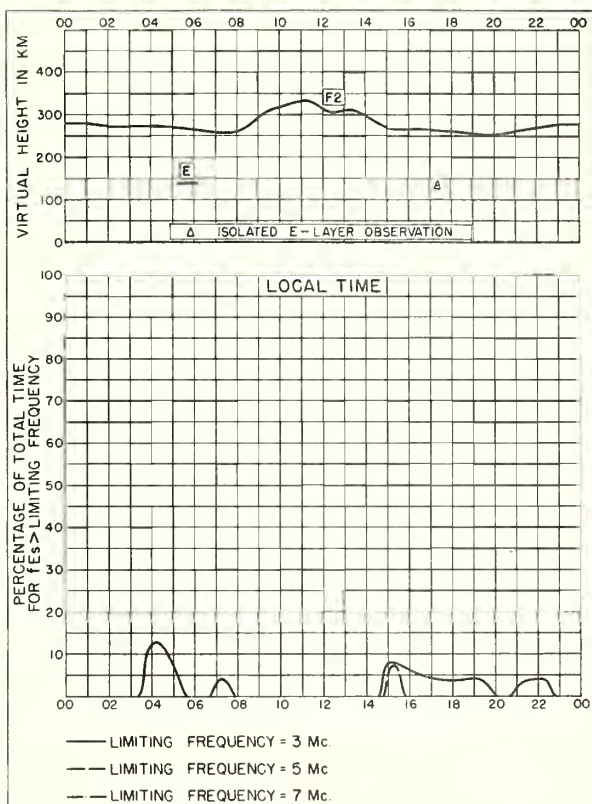


Fig. 6. BOSTON, MASSACHUSETTS

APRIL 1949

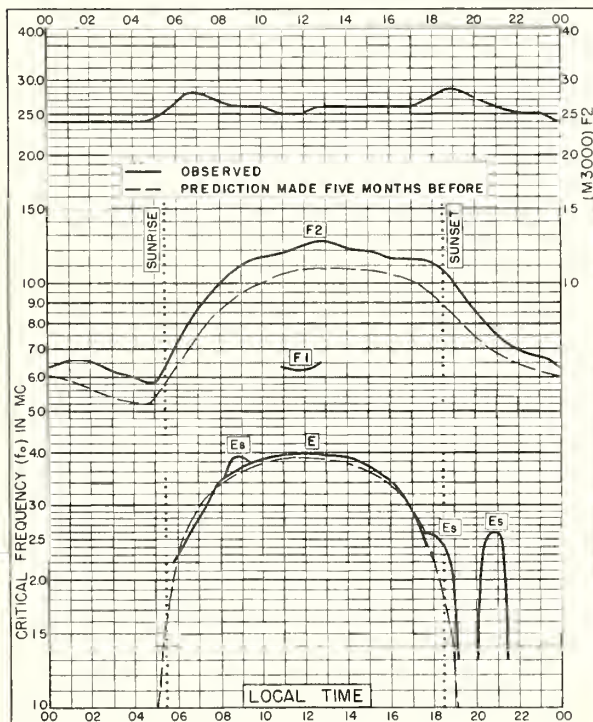


Fig. 7. SAN FRANCISCO, CALIFORNIA  
37.4°N, 122.2°W

APRIL 1949

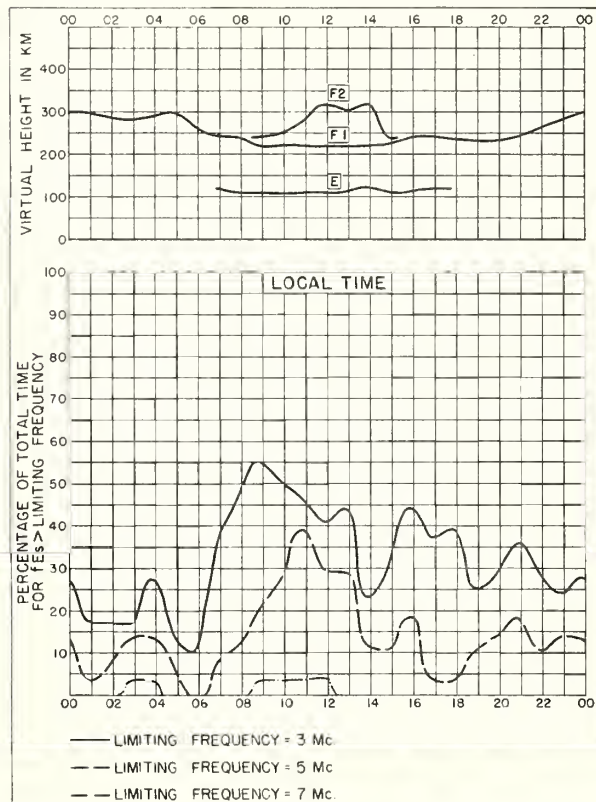


Fig. 8. SAN FRANCISCO, CALIFORNIA

APRIL 1949



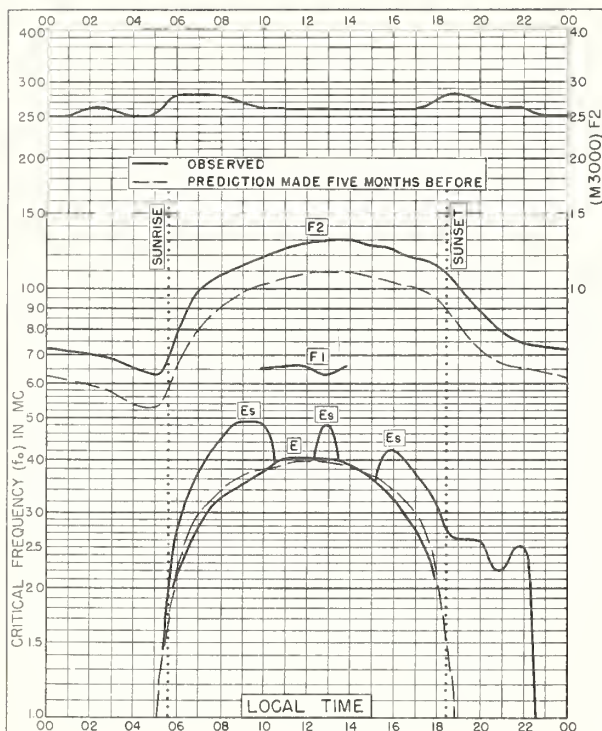


Fig. 9. WHITE SANDS, NEW MEXICO  
32.3°N, 106.5°W

APRIL 1949

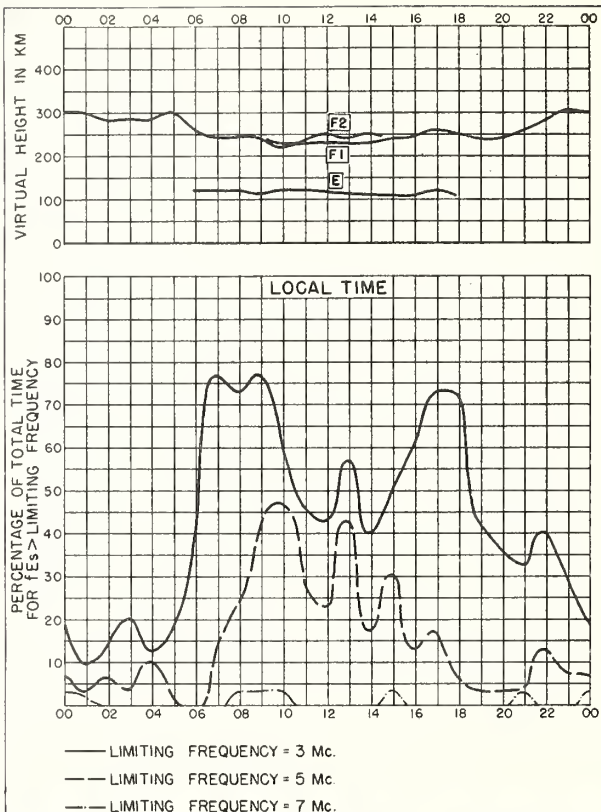


Fig. 10. WHITE SANDS, NEW MEXICO

APRIL 1949

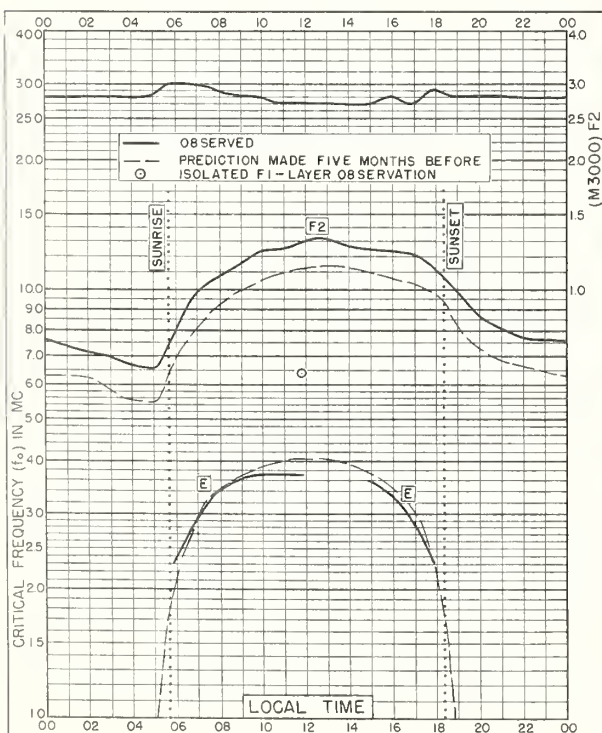


Fig. 11. BATON ROUGE, LOUISIANA  
30.5°N, 91.2°W

APRIL 1949

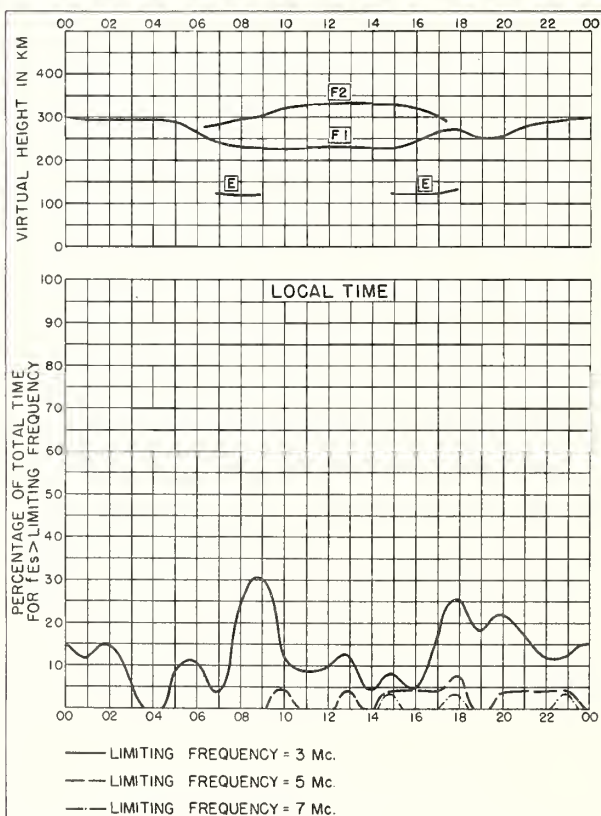


Fig. 12. BATON ROUGE, LOUISIANA

APRIL 1949



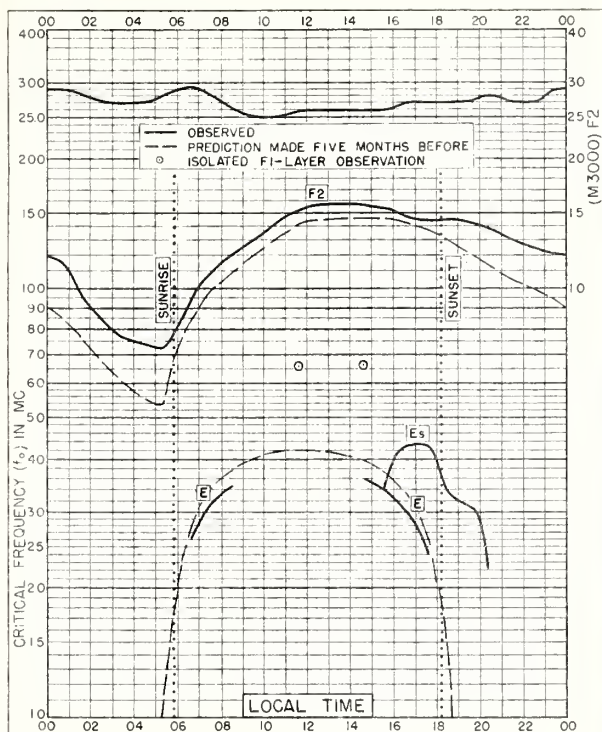


Fig. 13. MAUI, HAWAII  
20.8°N, 156.5°W

APRIL 1949

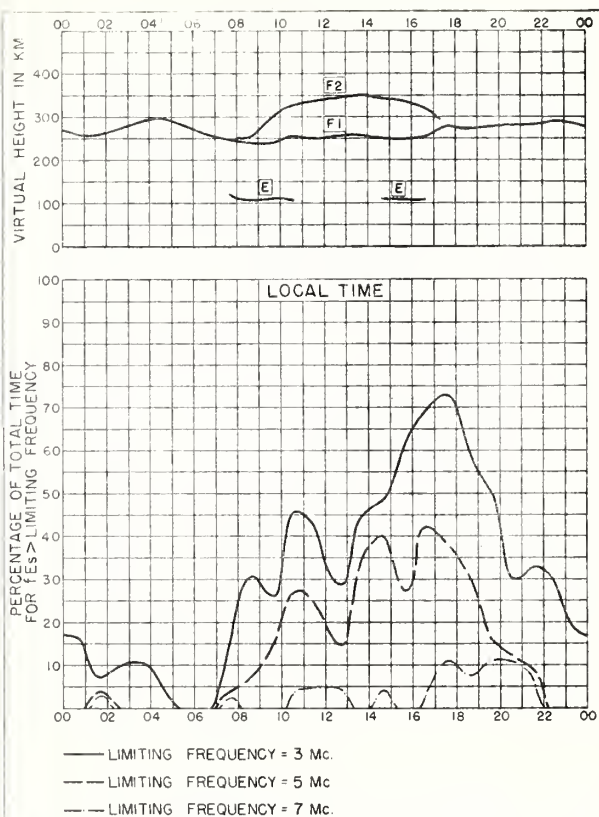


Fig. 14. MAUI, HAWAII

APRIL 1949

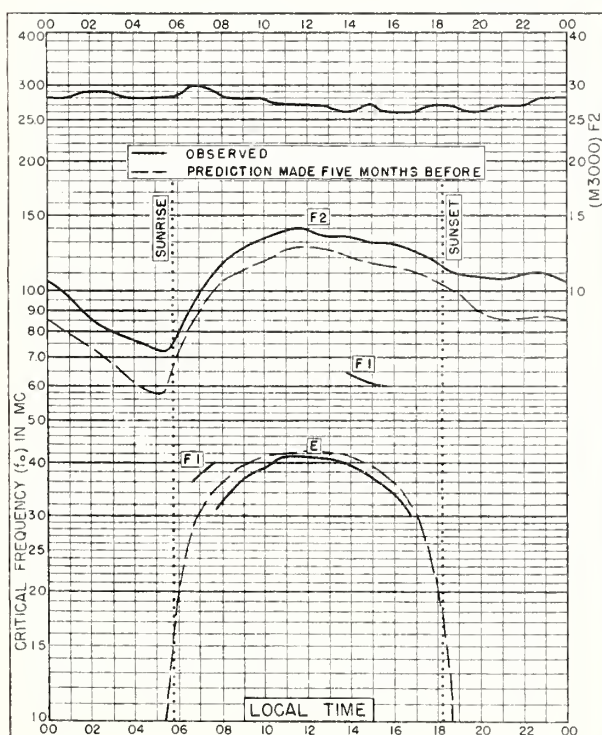


Fig. 15. SAN JUAN, PUERTO RICO  
18.4°N, 66.1°W

APRIL 1949

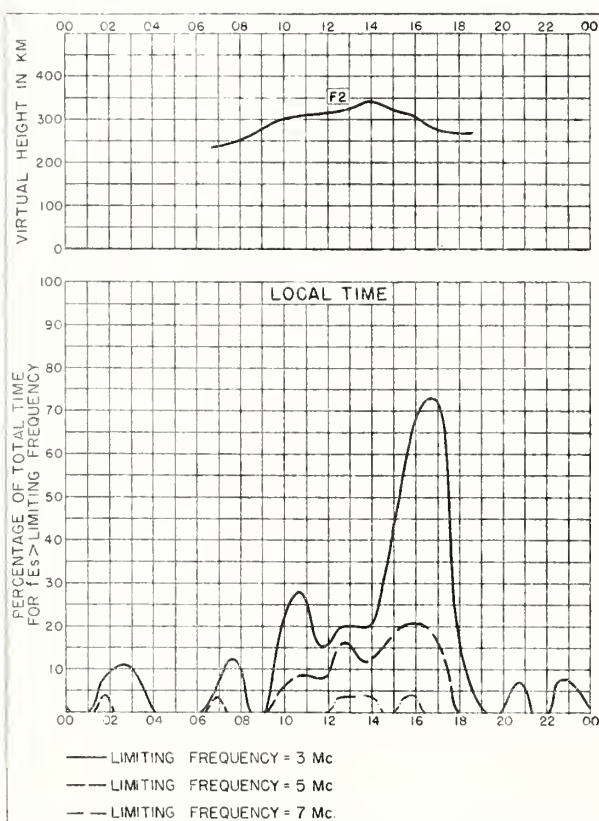


Fig. 16. SAN JUAN, PUERTO RICO

APRIL 1949

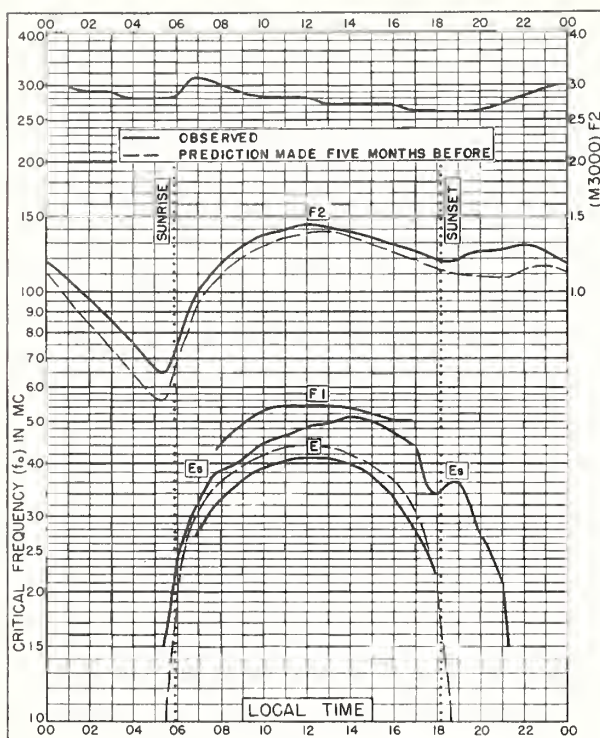


Fig. 17. TRINIDAD, BRIT. WEST INDIES  
10. 6°N, 61. 2°W

APRIL 1949

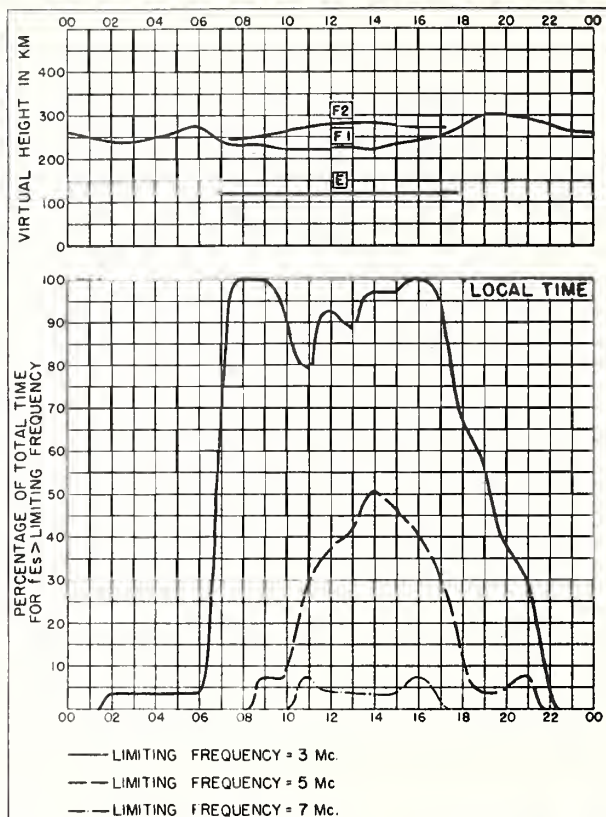


Fig. 18. TRINIDAD, BRIT. WEST INDIES

APRIL 1949

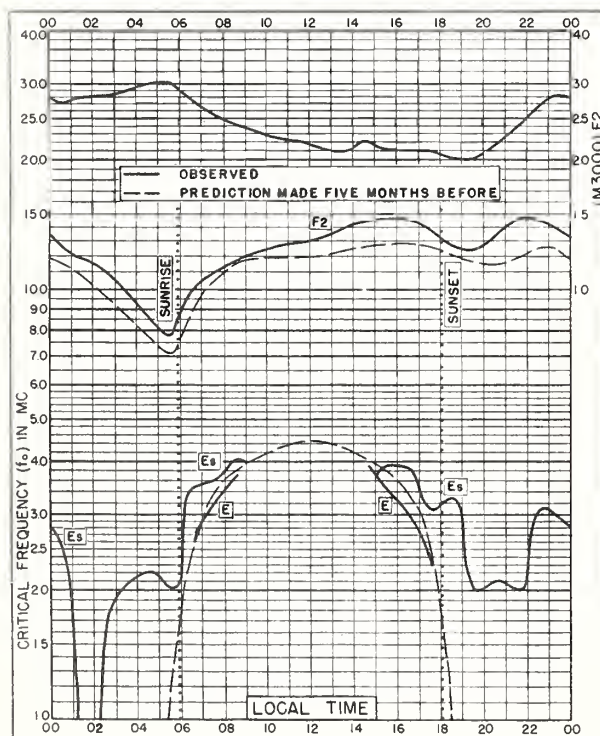


Fig. 19. PALMYRA I.  
5. 9°N, 162. 1°W

APRIL 1949

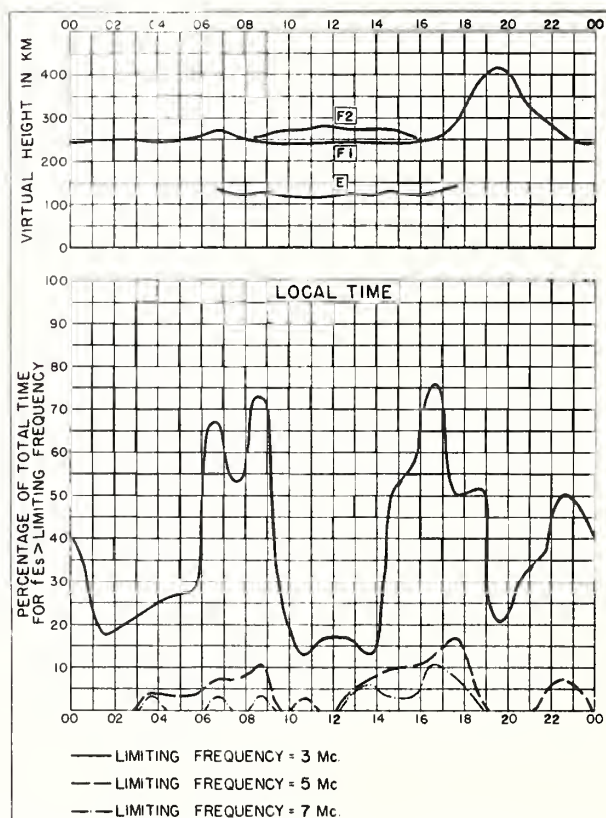


Fig. 20. PALMYRA I.

APRIL 1949



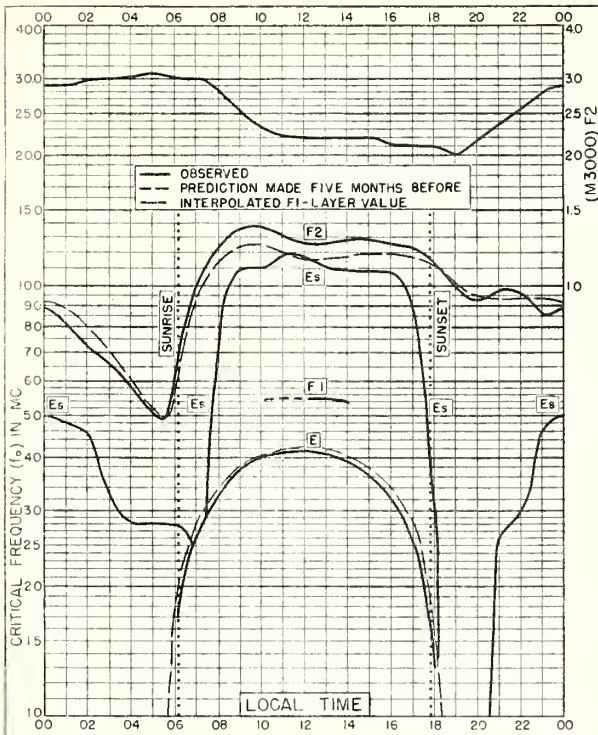


Fig. 21 HUANCAYO, PERU  
12.0°S, 75.3°W

APRIL 1949

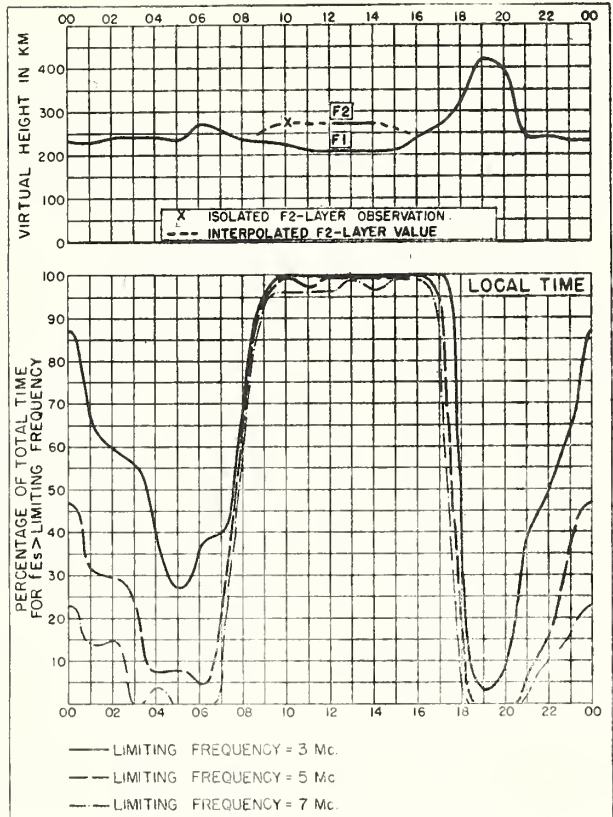


Fig. 22 HUANCAYO, PERU

APRIL 1949

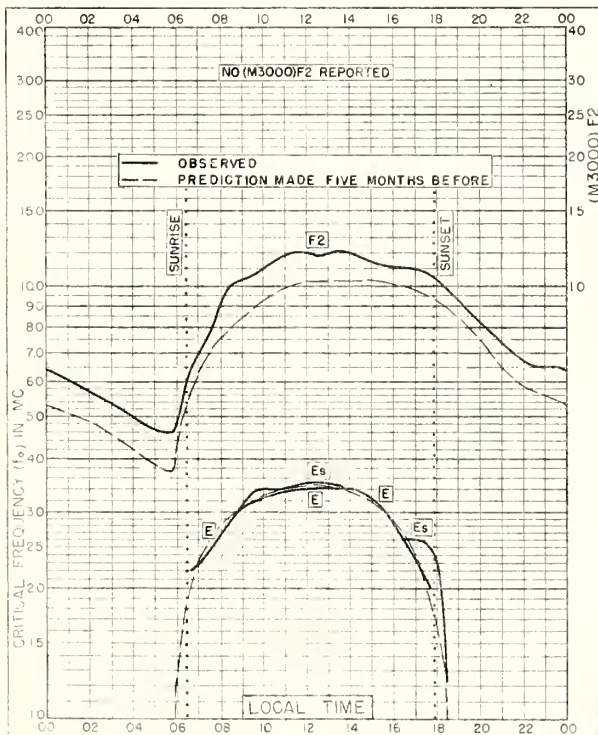


Fig. 23 LINDAU/HARZ, GERMANY  
51.6°N, 10.1°E

MARCH 1949

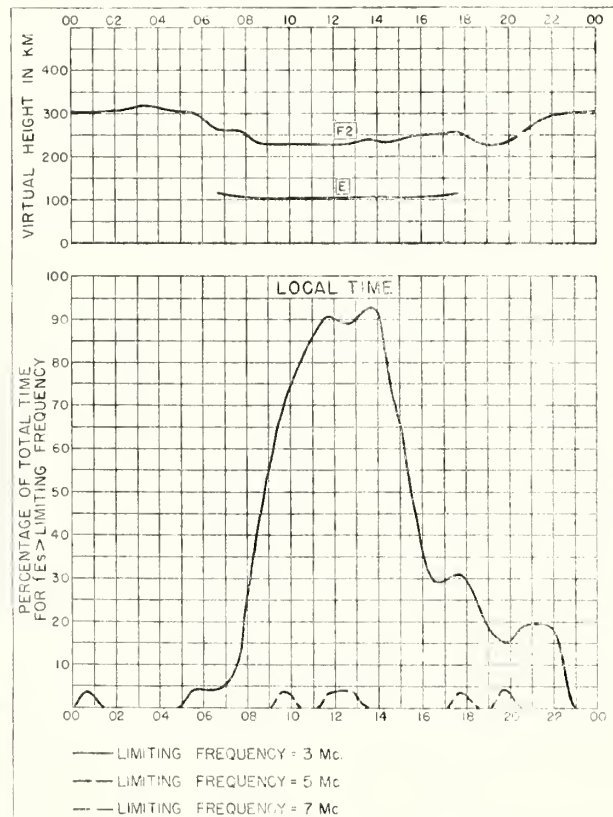


Fig. 24 LINDAU/HARZ, GERMANY

MARCH 1949

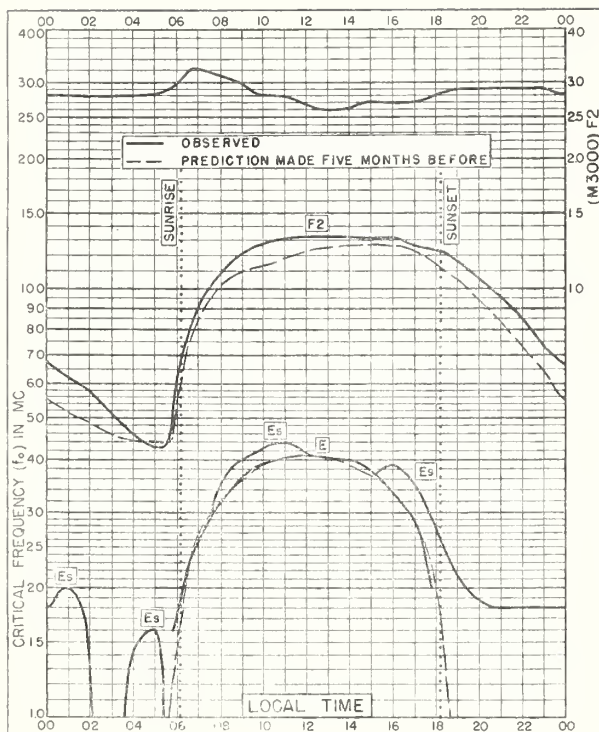


Fig. 25 JOHANNESBURG, U. OF S. AFRICA  
26.2°S, 28.0°E MARCH 1949

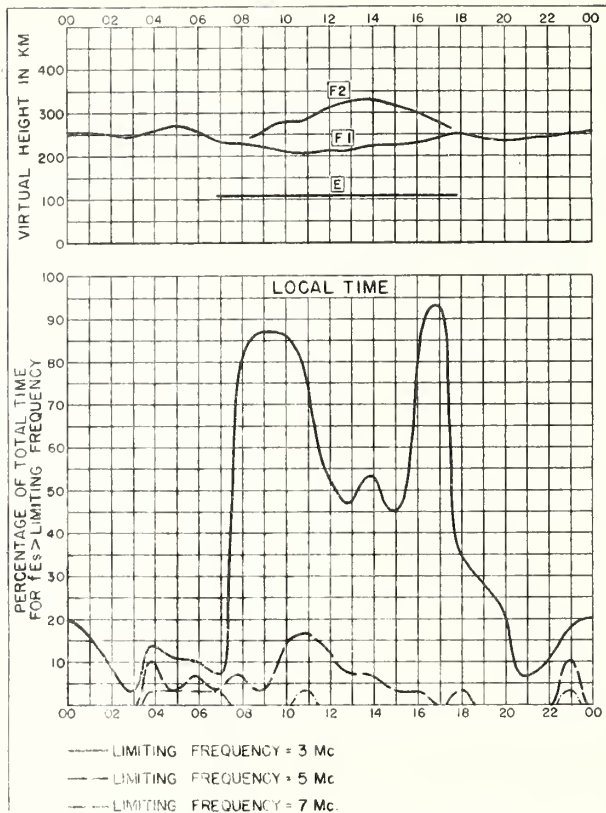


Fig. 26 JOHANNESBURG, U. OF S. AFRICA MARCH 1949

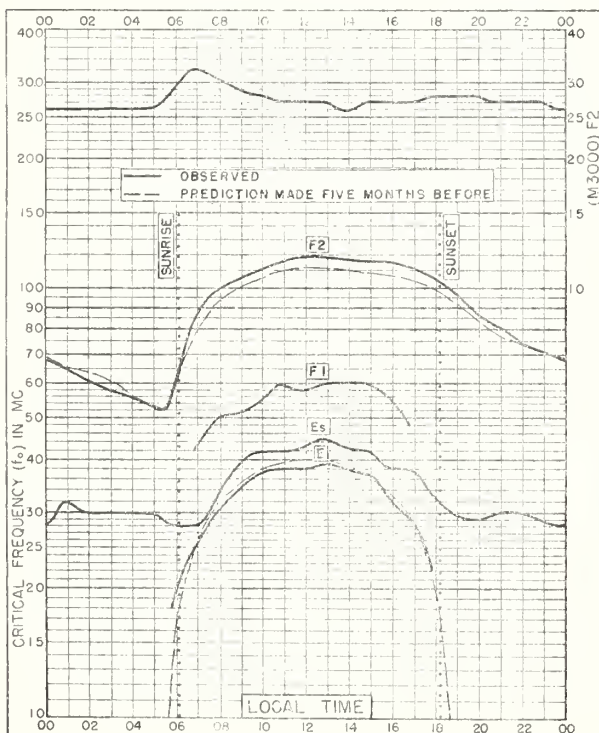


Fig. 27 WATHEROO, W. AUSTRALIA  
30.3°S, 115.9°E MARCH 1949

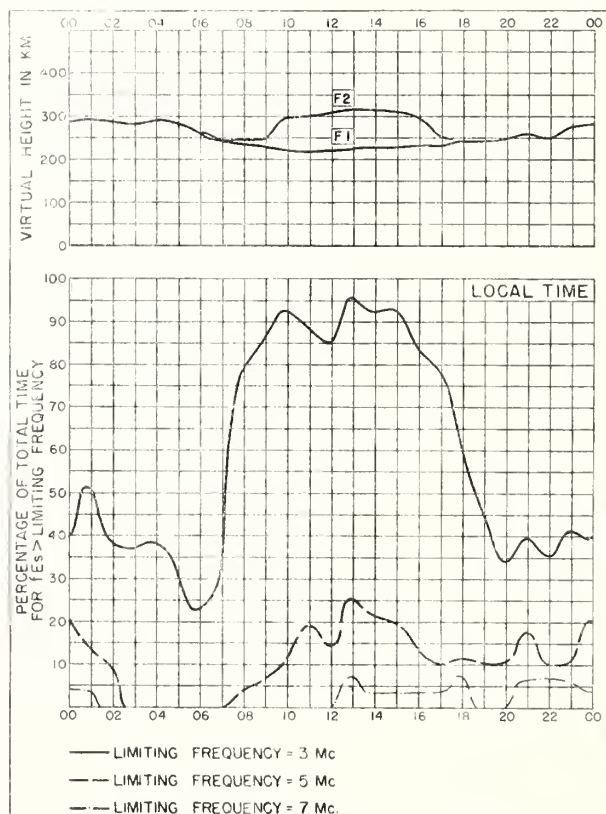
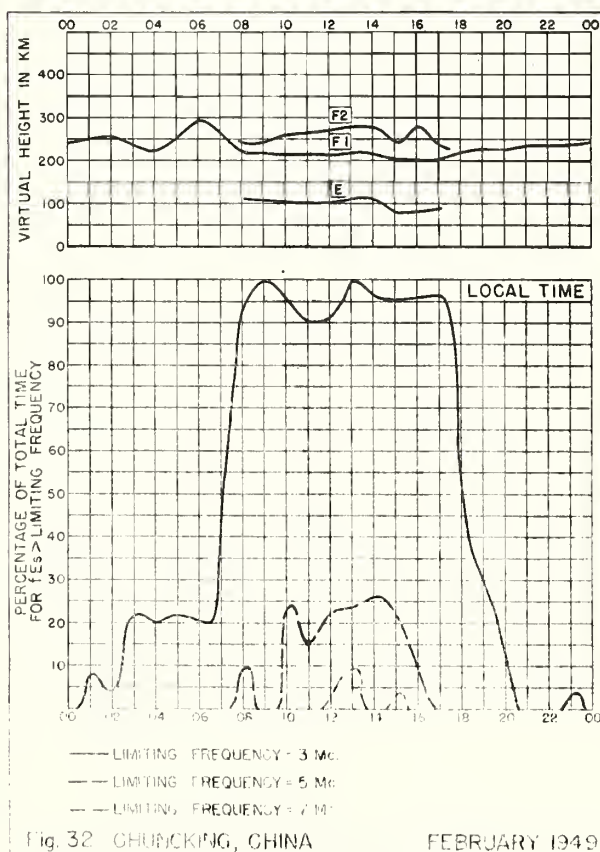
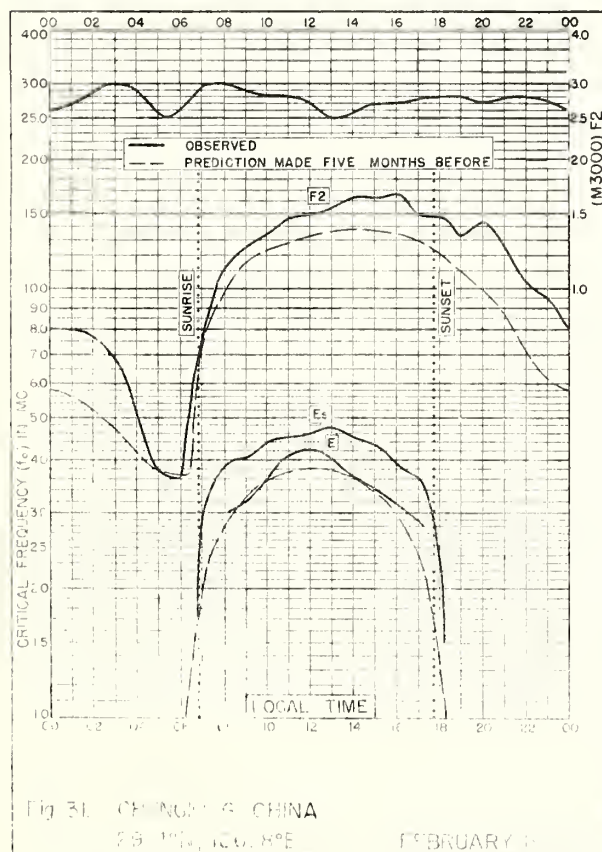
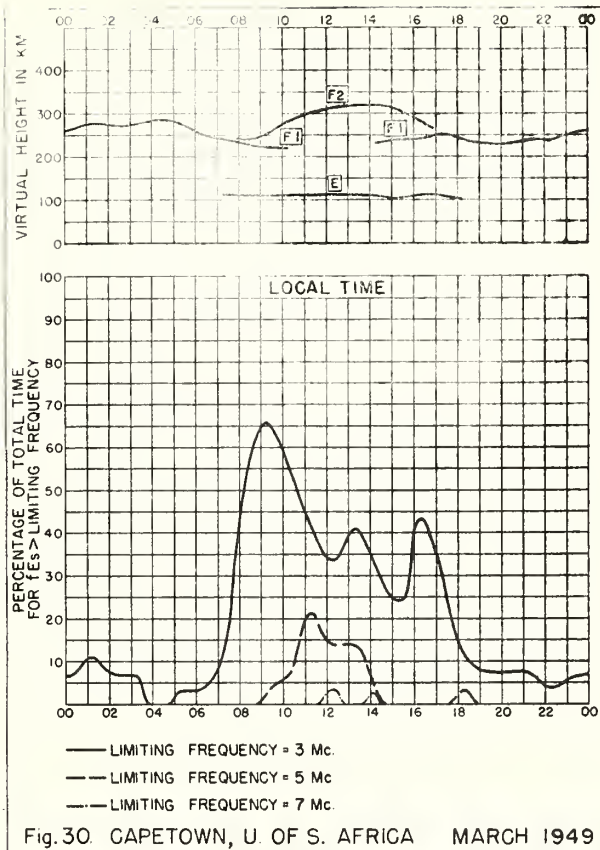
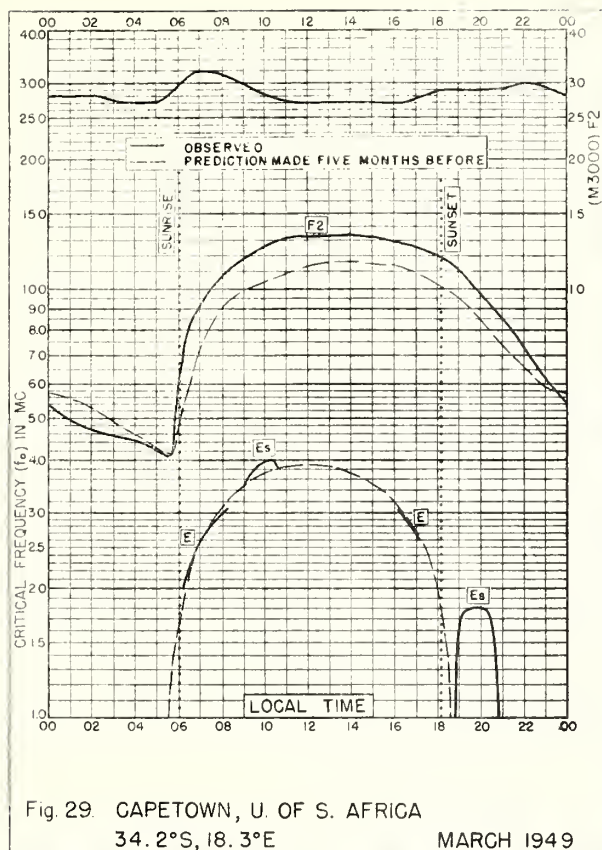


Fig. 28 WATHEROO, W. AUSTRALIA MARCH 1949





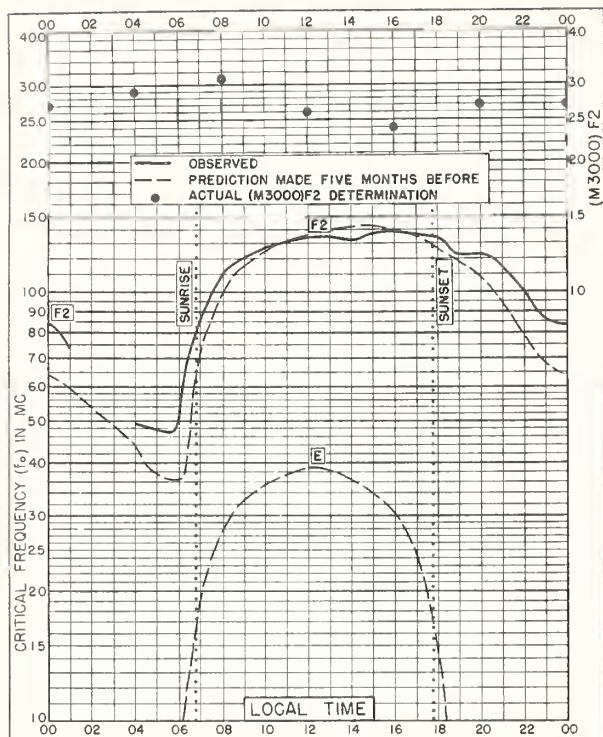


Fig. 33. DELHI, INDIA  
28.6°N, 77.1°E

FEBRUARY 1949

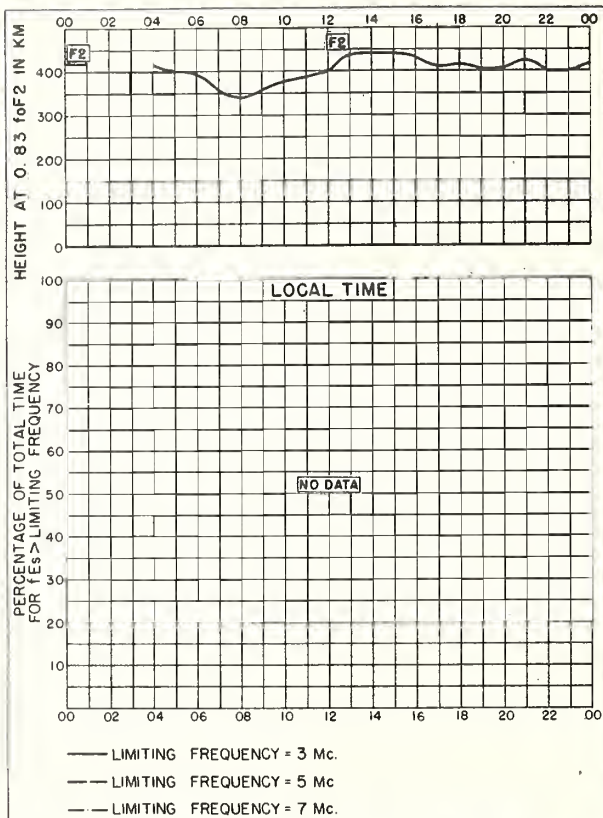


Fig. 34. DELHI, INDIA

FEBRUARY 1949

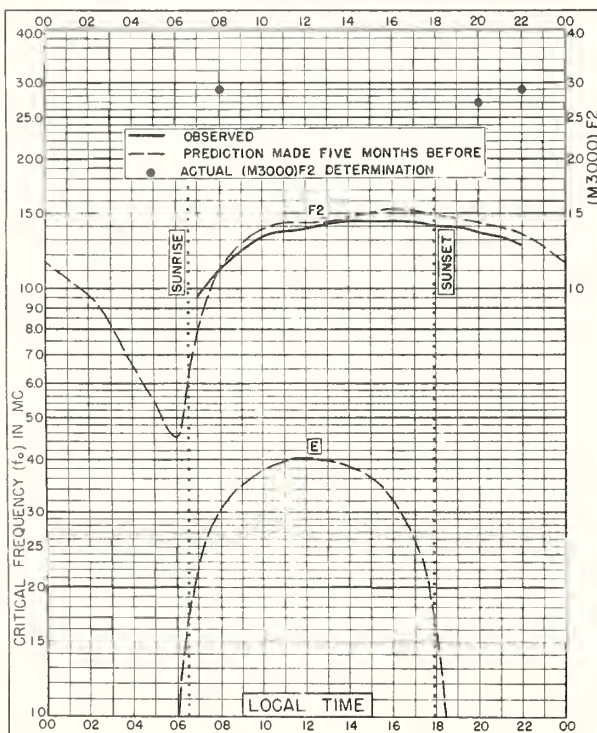


Fig. 35. BOMBAY, INDIA  
19.0°N, 73.0°E

FEBRUARY 1949

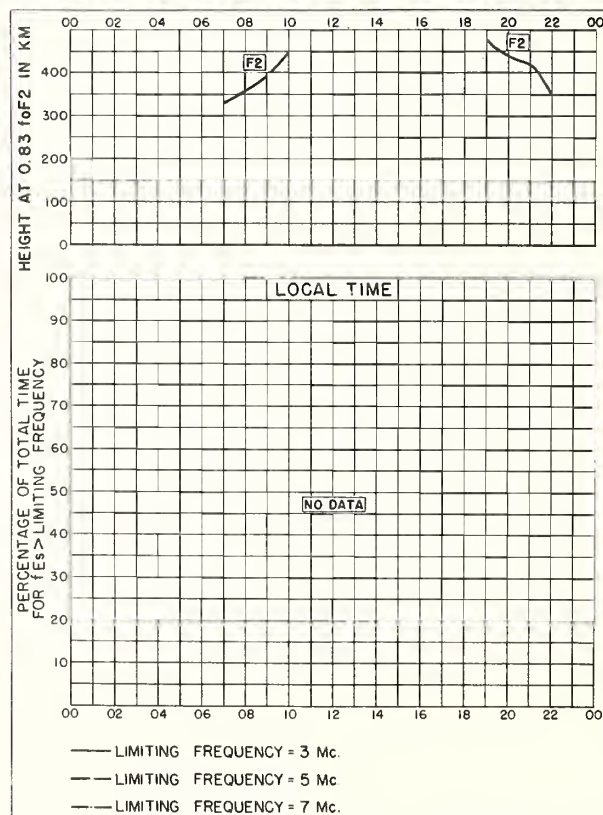


Fig. 36. BOMBAY, INDIA

FEBRUARY 1949



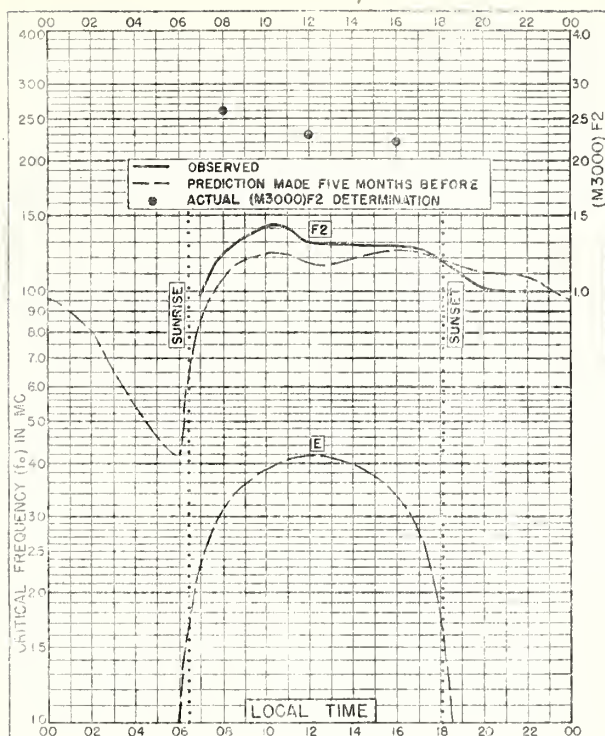


Fig. 37. MADRAS, INDIA  
13.0°N, 80.2°E

FEBRUARY 1949

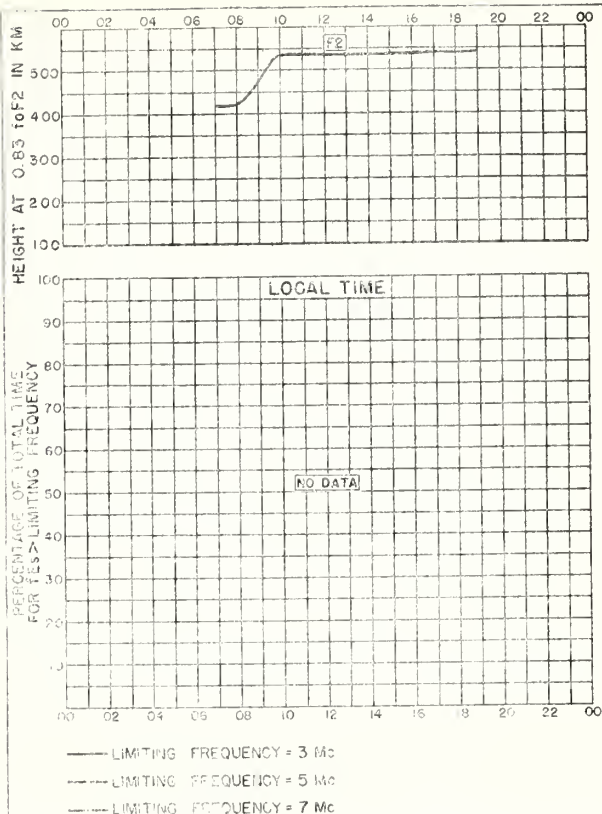


Fig. 38. MADRAS, INDIA

FEBRUARY 1949

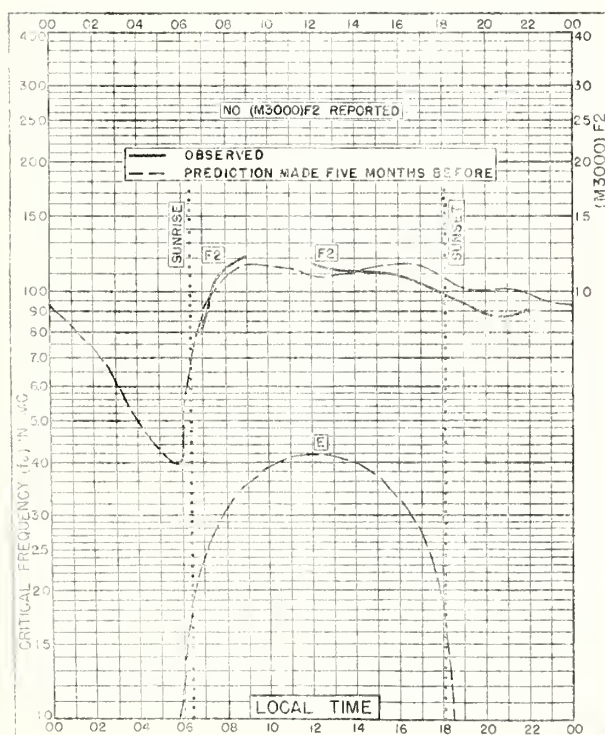


Fig. 39. TIRUCHIRAPALLI, INDIA  
10.8°N, 78.8°E

FEBRUARY 1949

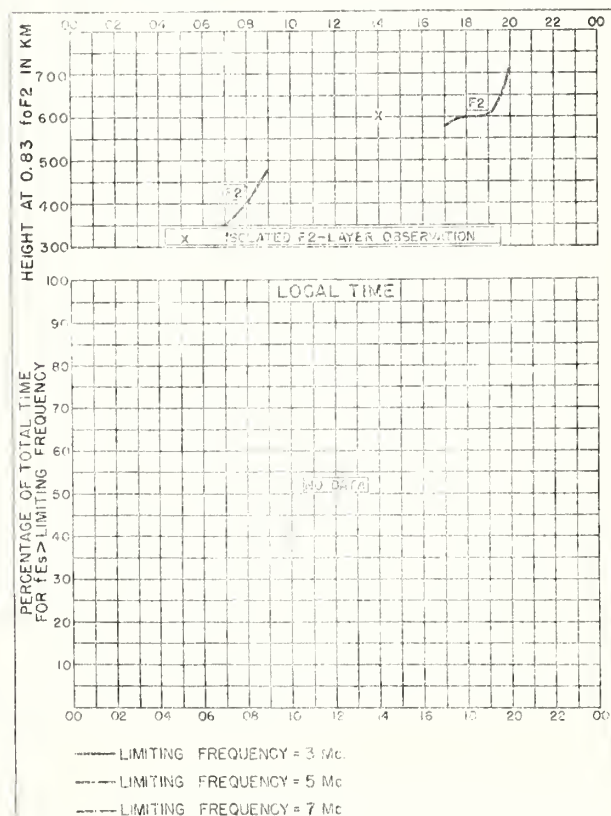
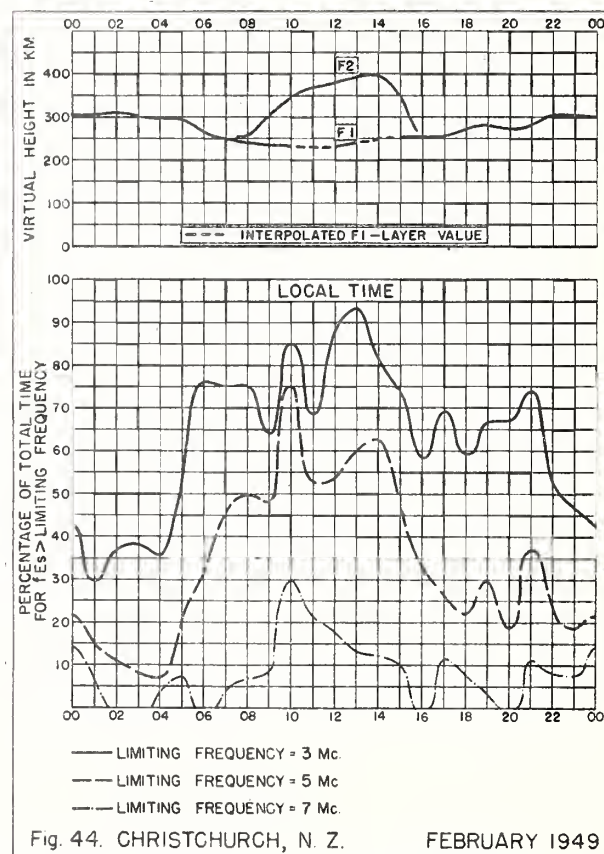
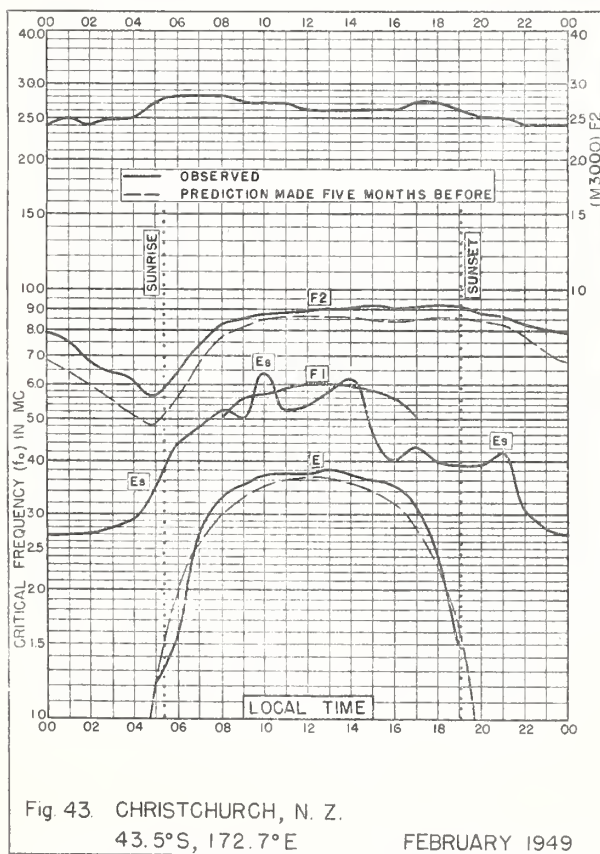
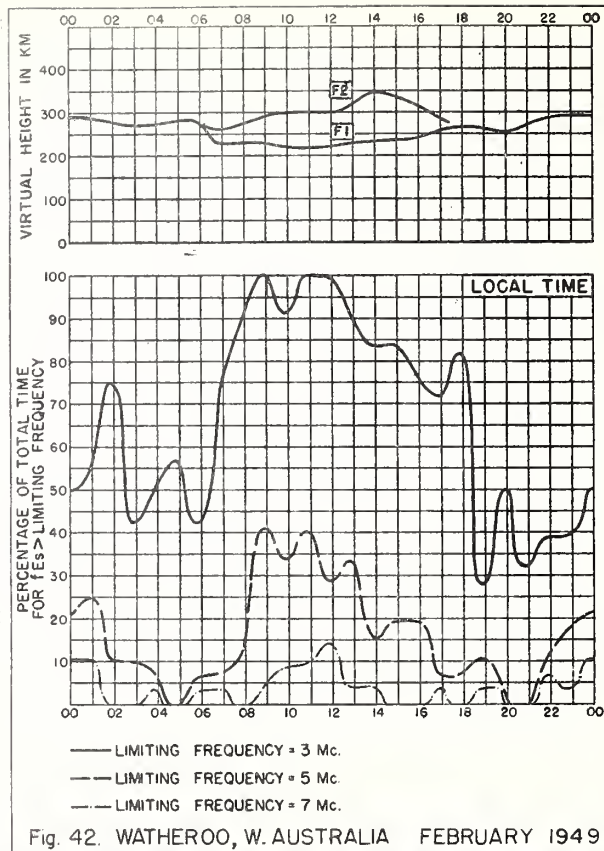
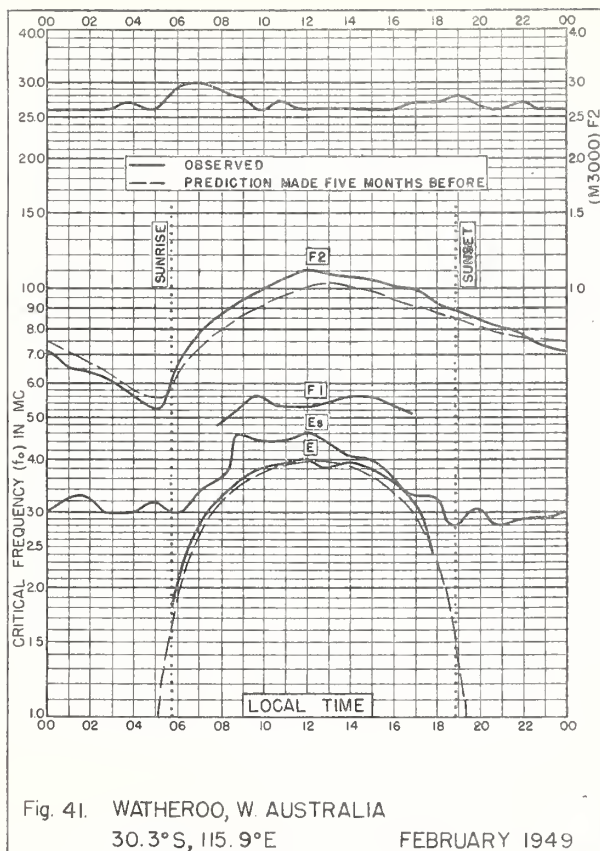
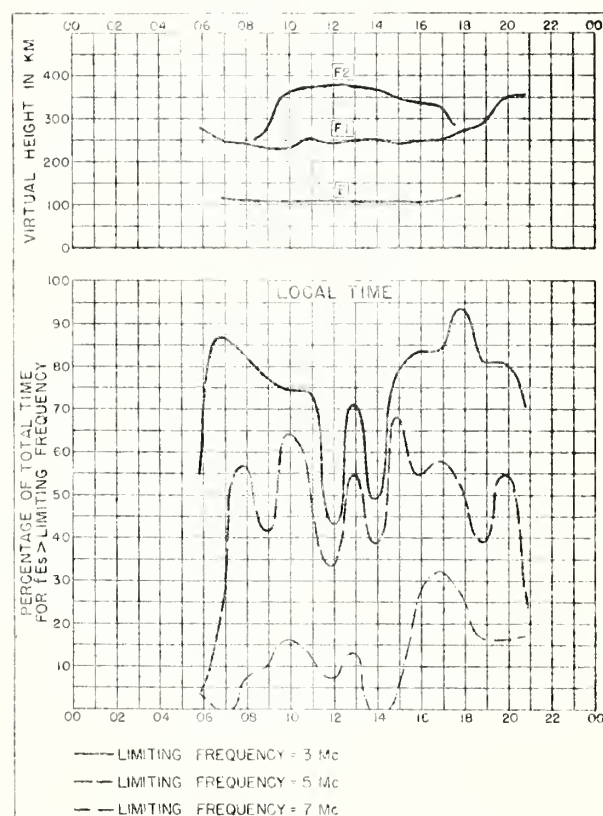
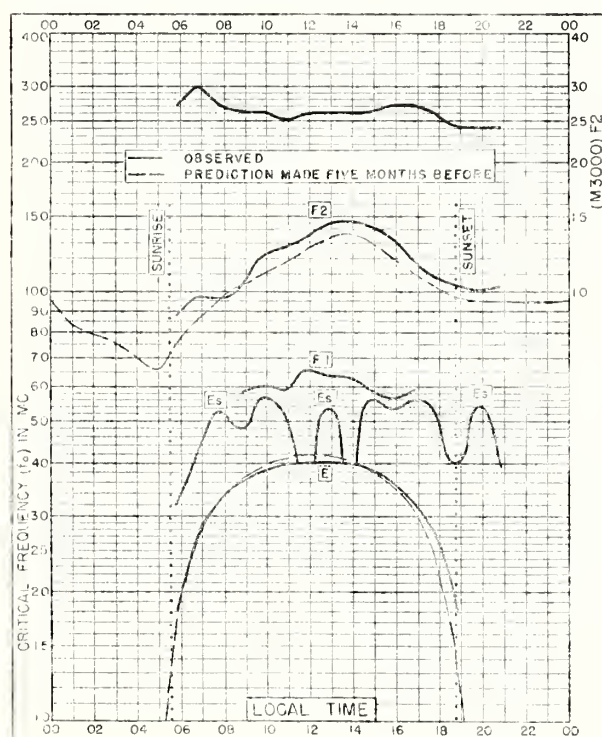
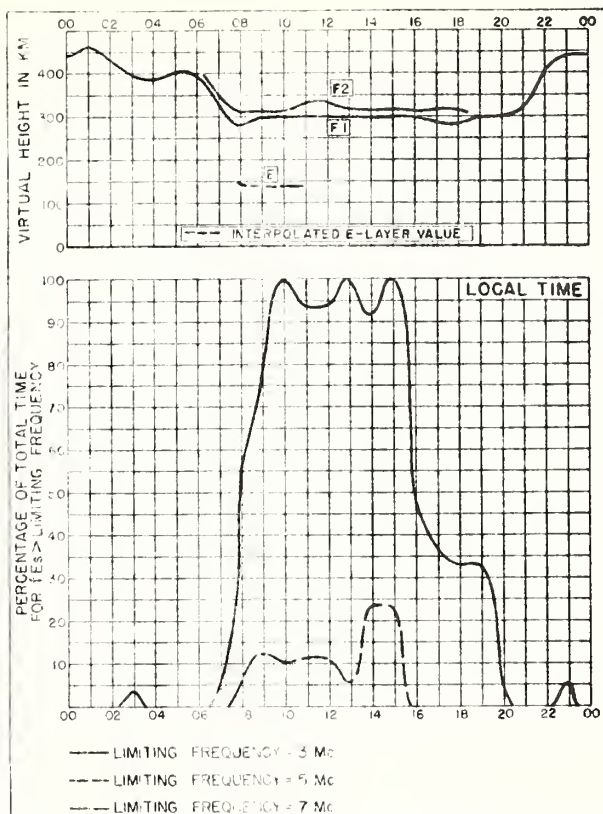
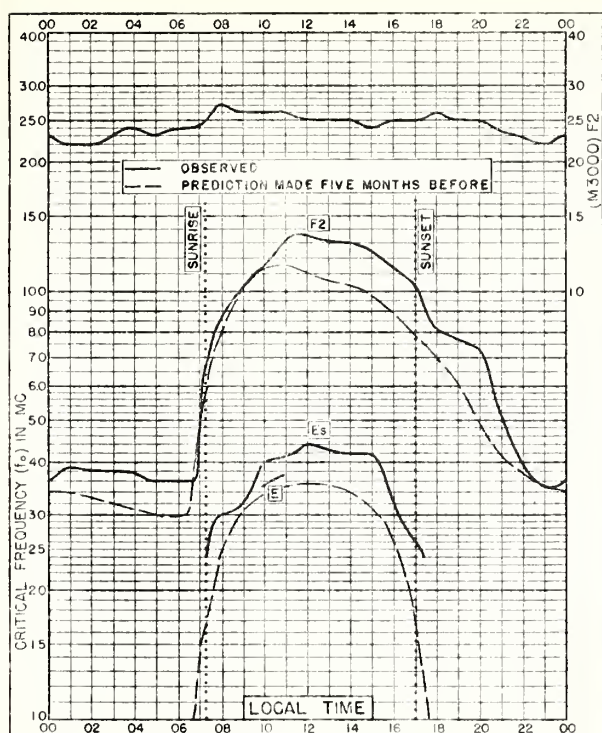


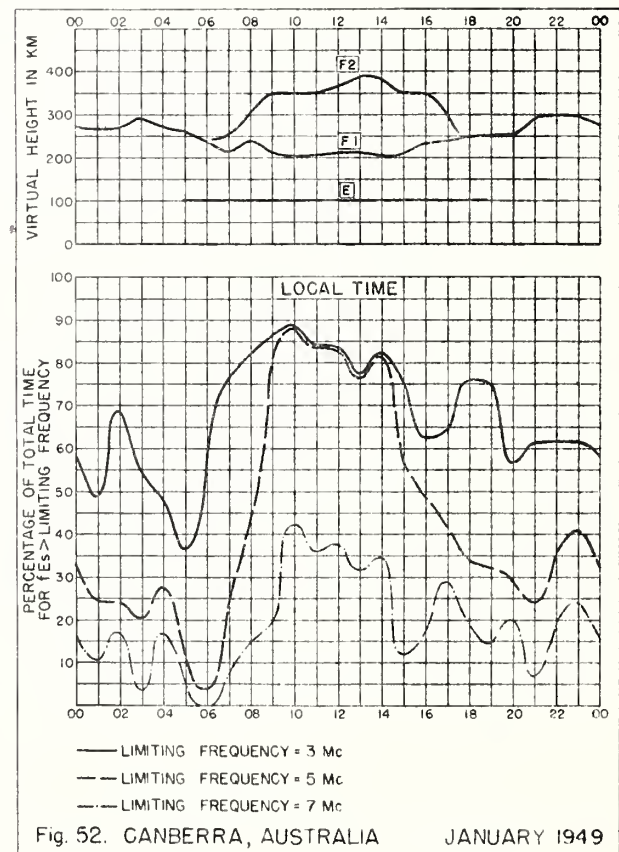
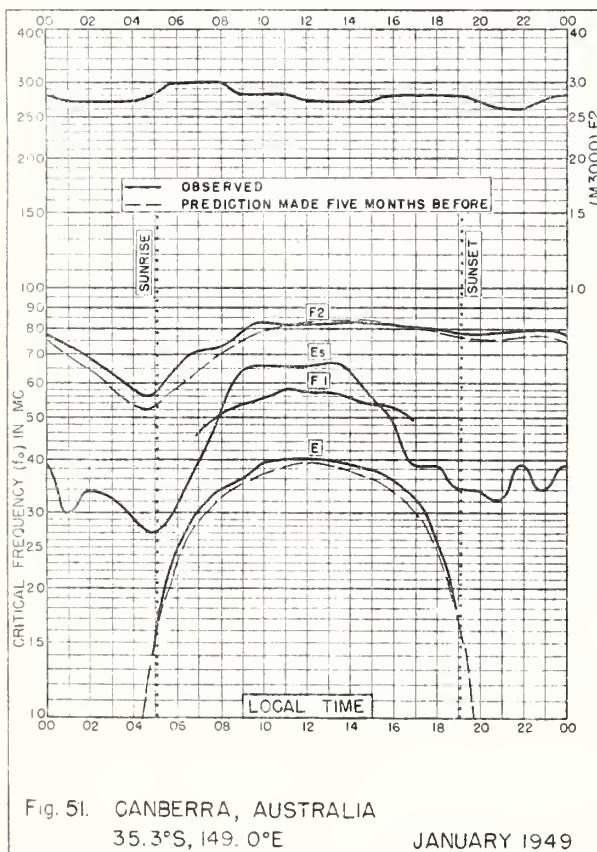
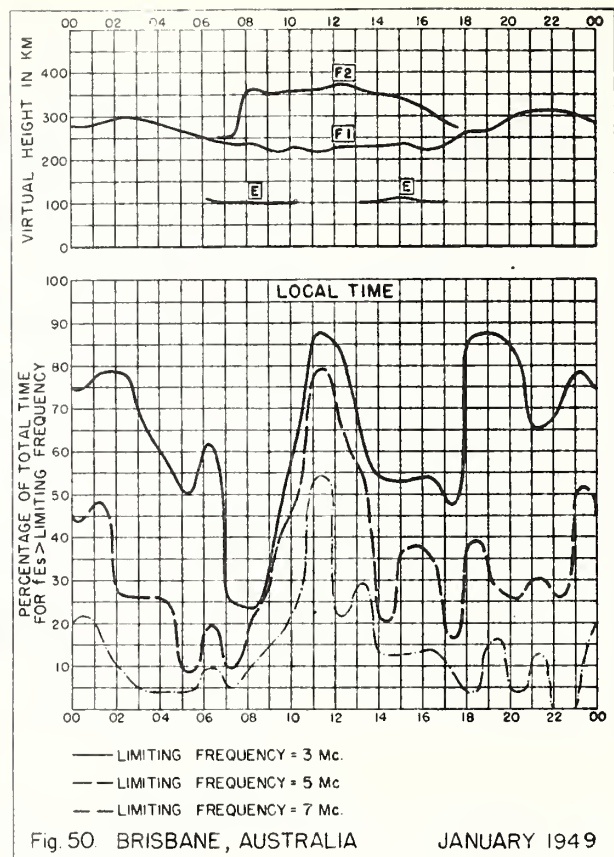
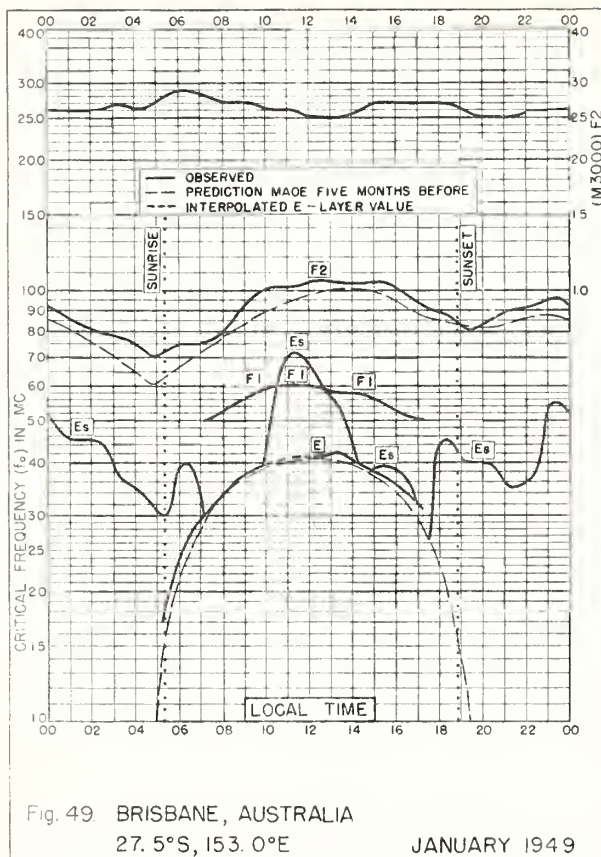
Fig. 40. TIRUCHIRAPALLI, INDIA

FEBRUARY 1949











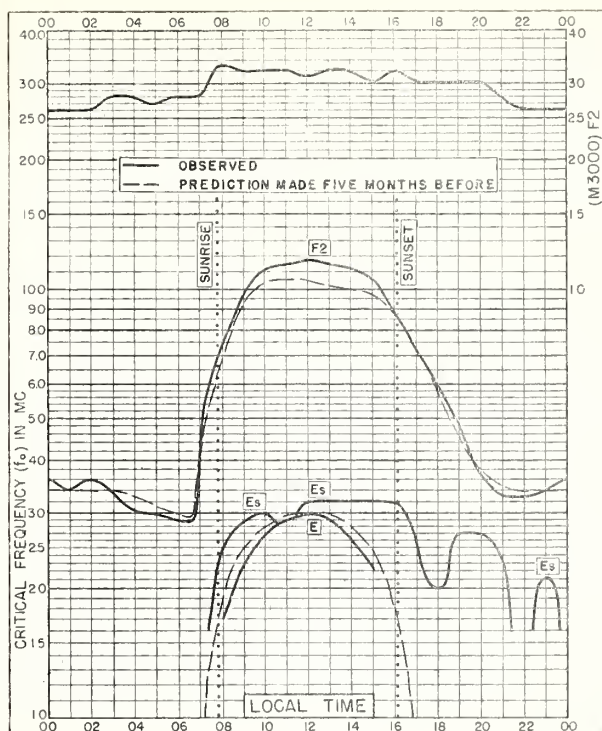


Fig. 53. FRIBOURG, GERMANY  
48.1°N, 7.8°E

DECEMBER 1948

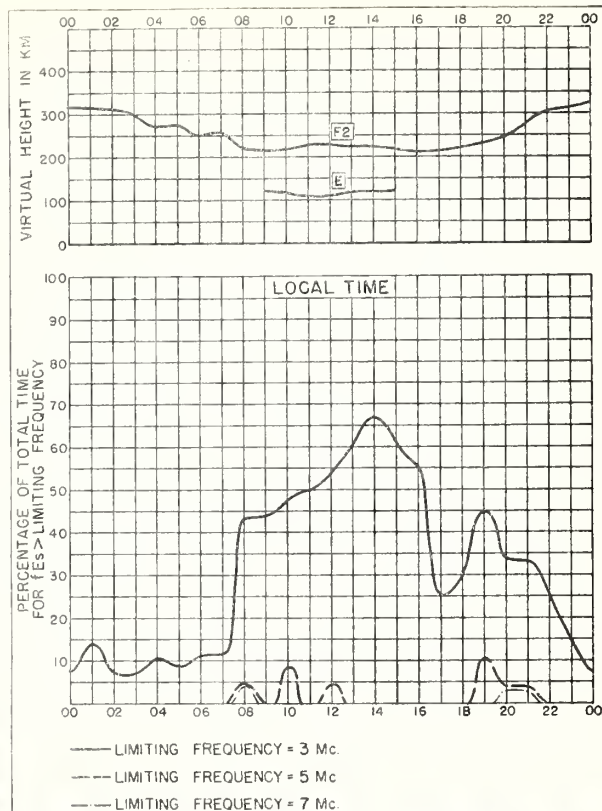


Fig. 54. FRIBOURG, GERMANY

DECEMBER 1948

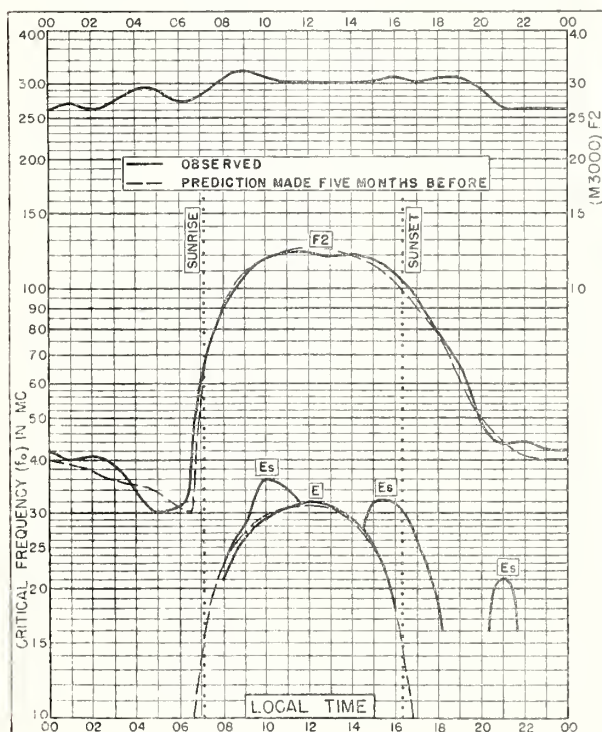


Fig. 55. FRIBOURG, GERMANY  
48.1°N, 7.8°E

NOVEMBER 1948

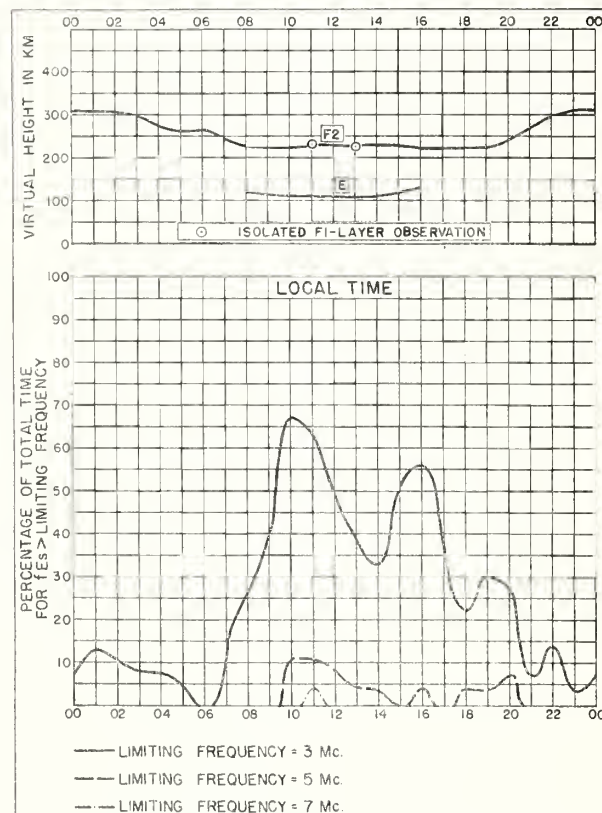


Fig. 56. FRIBOURG, GERMANY

NOVEMBER 1948

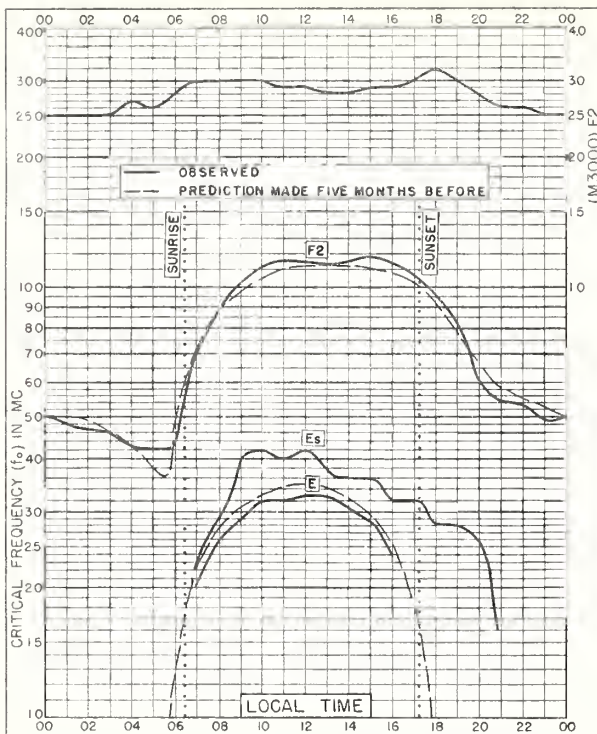


Fig. 57. FRIBOURG, GERMANY  
48.1°N, 7.8°E

OCTOBER 1948

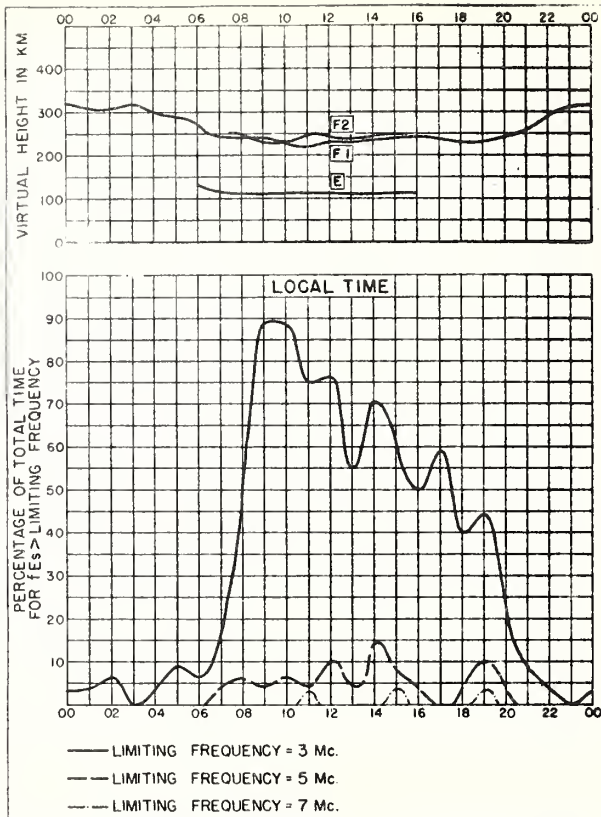


Fig. 58. FRIBOURG, GERMANY

OCTOBER 1948



Index of Tables and Graphs of Atmospheric Data

1948-1949

	<u>Table page</u>	<u>Figure page</u>
Baton Rouge, Louisiana		
April 1949 . . . . .	11	40
Bombay, India		
February 1949 . . . . .	14	46
Boston, Massachusetts		
April 1949 . . . . .	10	39
Brisbane, Australia		
January 1949 . . . . .	16	50
Canberra, Australia		
January 1949 . . . . .	16	50
Capetown, Union of S. Africa		
March 1949 . . . . .	13	48
Christchurch, New Zealand		
February 1949 . . . . .	15	48
Chungking, China		
February 1949 . . . . .	13	48
Delhi, India		
February 1949 . . . . .	14	46
Fribourg, Germany		
December 1948 . . . . .	16	52
November 1948 . . . . .	17	53
October 1948 . . . . .	17	52
Huancayo, Peru		
April 1949 . . . . .	12	47
Johannesburg, Union of S. Africa		
March 1949 . . . . .	13	44
Lanchow, China		
January 1949 . . . . .	15	49
Lindau/Harz, Germany		
April 1949 . . . . .	10	38
March 1949 . . . . .	12	43
Madras, India		
February 1949 . . . . .	14	47
Maui, Hawaii		
April 1949 . . . . .	11	41
Palmyra I.		
April 1949 . . . . .	12	42
Rarotonga I.		
January 1949 . . . . .	15	49
San Francisco, California		
April 1949 . . . . .	10	39
San Juan, Puerto Rico		
April 1949 . . . . .	11	41

Index (CRPL-F58, continued)

	<u>Table page</u>	<u>Figure page</u>
Tiruchirapalli, India		
February 1949 . . . . .	14	47
Trinidad, British West Indies		
April 1949 . . . . .	12	42
Washington, D. C.		
May 1949 . . . . .	10	38
Watheroo, W. Australia		
March 1949 . . . . .	13	44
February 1949 . . . . .	15	48
White Sands, New Mexico		
April 1949 . . . . .	11	40

## CRPL and IRPL Reports

[A list of CRPL Section Reports is available from the Central Radio Propagation Laboratory upon request]

### Daily:

Radio disturbance warnings, every half hour from broadcast station WWV of the National Bureau of Standards. Telephoned and telegraphed reports of ionospheric, solar, geomagnetic, and radio propagation data.

### Weekly:

CRPL-J. Radio Propagation Forecast (of days most likely to be disturbed during following month).

### Semimonthly:

CRPL-Ja. Semimonthly Frequency Revision Factors for CRPL Basic Radio Propagation Prediction Reports.

### Monthly:

CRPL-D. Basic Radio Propagation Predictions—Three months in advance. (Dept. of the Army, TB 11-499, monthly supplements to TM 11-499; Dept. of the Navy, DNC-13-1 ( ), monthly supplements to DNC-13-1.)

CRPL-F. Ionospheric Data.

### Quarterly:

\*IRPL-A. Recommended Frequency Bands for Ships and Aircraft in the Atlantic and Pacific.

\*IRPL-H. Frequency Guide for Operating Personnel.

### Circulars of the National Bureau of Standards:

NBS Circular 462. Ionospheric Radio Propagation.

NBS Circular 465. Instructions for the Use of Basic Radio Propagation Predictions.

### Reports issued in past:

IRPL-C61. Report of the International Radio Propagation Conference, 17 April to 5 May 1944.

IRPL-G1 through G12. Correlation of D. F. Errors With Ionospheric Conditions.

IRPL-R. Nonscheduled reports:

R4. Methods Used by IRPL for the Prediction of Ionosphere Characteristics and Maximum Usable Frequencies.

R5. Criteria for Ionospheric Storminess.

R6. Experimental Studies of Ionospheric Propagation as Applied to the Loran System.

R7. Second Report on Experimental Studies of Ionospheric Propagation as Applied to the Loran System.

R9. An Automatic Instantaneous Indicator of Skip Distance and MUF.

R10. A Proposal for the Use of Rockets for the Study of the Ionosphere.

R11. A Nomographic Method for Both Prediction and Observation Correlation of Ionosphere Characteristics.

R12. Short Time Variations in Ionospheric Characteristics.

R14. A Graphical Method for Calculating Ground Reflection Coefficients.

R15. Predicted Limits for F2-layer Radio Transmission Throughout the Solar Cycle.

R17. Japanese Ionospheric Data—1943.

R18. Comparison of Geomagnetic Records and North Atlantic Radio Propagation Quality Figures—October 1943 Through May 1945.

R21. Notes on the Preparation of Skip-Distance and MUF Charts for Use by Direction-Finder Stations. (For distances out to 4000 km.)

R23. Solar-Cycle Data for Correlation with Radio Propagation Phenomena.

R24. Relations Between Band Width, Pulse Shape and Usefulness of Pulses in the Loran System.

R25. The Prediction of Solar Activity as a Basis for the Prediction of Radio Propagation Phenomena.

R26. The Ionosphere as a Measure of Solar Activity.

R27. Relationships Between Radio Propagation Disturbance and Central Meridian Passage of Sunspots Grouped by Distance From Center of Disc.

R30. Disturbance Rating in Values of IRPL Quality-Figure Scale from A. T. & T. Co. Transmission Disturbance Reports to Replace T. D. Figures as Reported.

R31. North Atlantic Radio Propagation Disturbances, October 1943 Through October 1945.

R33. Ionospheric Data on File at IRPL.

R34. The Interpretation of Recorded Values of  $fE_s$ .

R35. Comparison of Percentage of Total Time of Second-Multiple  $E_s$  Reflections and That of  $fE_s$  in Excess of 3 Mc.

IRPL-T. Reports on tropospheric propagation:

T1. Radar operation and weather. (Superseded by JANP 101.)

T2. Radar coverage and weather. (Superseded by JANP 102.)

CRPL T3. Tropospheric Propagation and Radio-Meteorology. (Reissue of Columbia Wave Propagation Group WPG-5.)

\*Items bearing this symbol are distributed only by U. S. Navy. They are issued under one cover as the DNC-14 series.

